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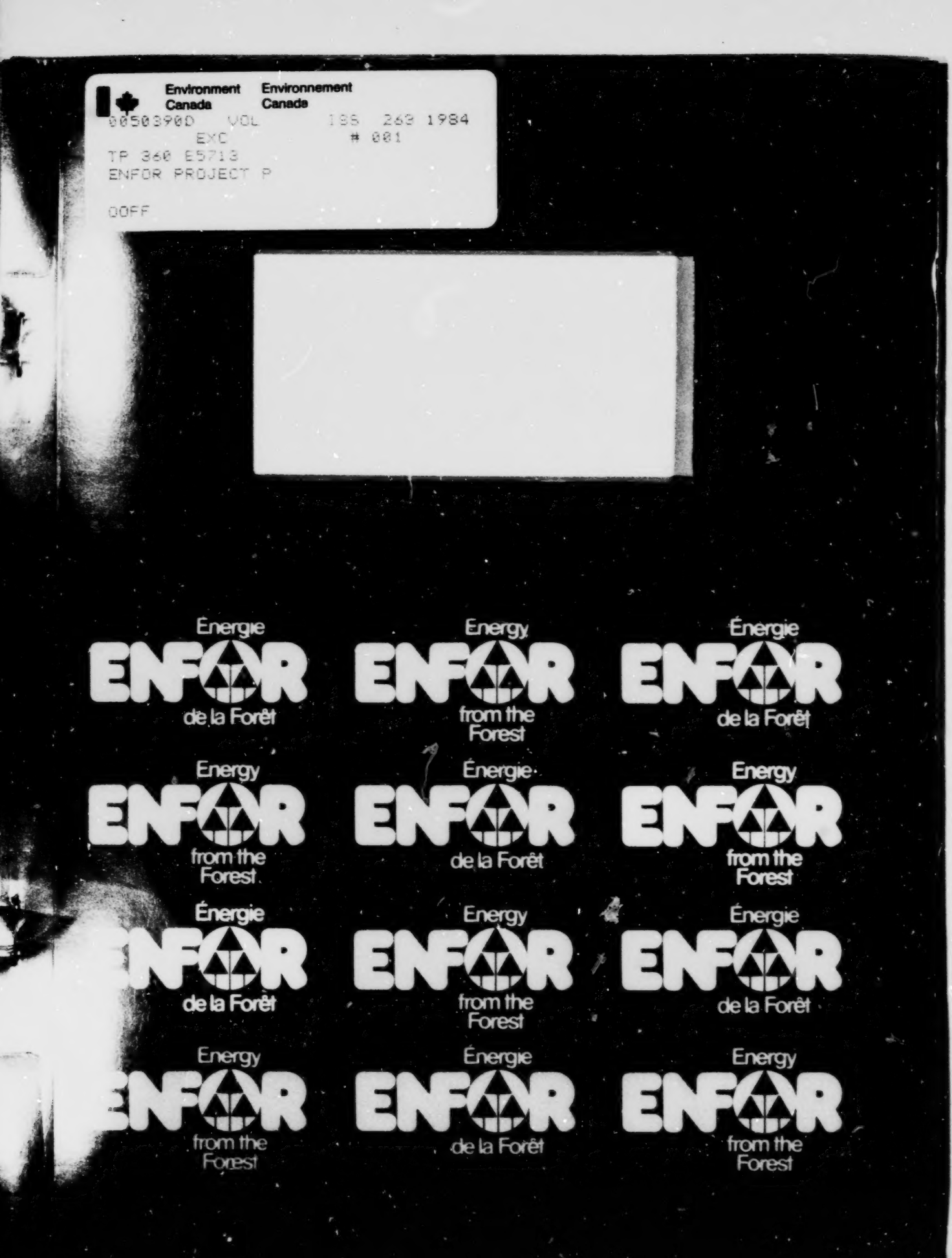

Contractor's Final Report [1/]

DSS Contract 07SC.KH205-3-0044

ENFOR Project P-263

Domestic Fuelwood Consumption In Newfoundland

by

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August 1984

EXECUTIVE SUMMARY

1. INTRODUCTION

In 1979, ENFOR Project P-2 provided an estimate of domestic fuelwood consumption for most of the island of Newfoundland (Northland Associates Ltd., 1980). A continuing high demand for fuelwood on the island is imposing a considerable drain on the forest resource in some areas. Consequently, this present study was undertaken to update the 1979 results and to expand the consumption estimates to the entire island. Additional, but related, information would be collected at the same time.

The objectives of the study are:

- To investigate the current and future demands for domestic fuelwood for the island of Newfoundland, with special emphasis on the Avalon Peninsula.

- To interview unit foresters for the purpose of gaining additional insight into fuelwood supply and demand in each unit.

- To identify and interview commercial fuelwood retailers on the island.

- To assess the fuelwood drain on the Avalon Peninsula.

2. METHODS

The 15 populated Forestry Management Units (Units 1-3, 5, 7-12, 14-18) on the island are the focus of this study.

In close consultation with forestry personnel in each management unit, each of the 15 populated units was stratified for sampling purposes. In the stratification process, communities in each unit were assigned to one of the following strata:

Low	- 0 to 33% of households burn wood
Medium	- 34 to 66% of households burn wood
High	- 67 to 100% of households burn wood

After stratification, the households to be sampled were randomly selected from current telephone directories. These directories provided access to 97+% of the households on the island; we considered this to be an acceptable access rate for the survey.

Ten thousand households were selected for sampling; mailed questionnaires were sent to 6,000 households, and 4,000 households were chosen for telephone interview. The same questionnaire was used for both methods. Sampling was by proportional allocation of samples based on the population of each stratum.

Information from both the mail questionnaires and telephone interviews was edited and keyed into a computer.

A 43% return was realized from the mail questionnaire. A follow-up telephone interview was conducted with 926 of the non-respondents from this questionnaire to compare wood consumption rates and other relevant data with that of respondents.

3. RESULTS

A total of 6,713 households on the island were surveyed.

The results of the mail questionnaire and telephone interviews were found to be statistically similar and were combined to provide information on most aspects of domestic fuelwood harvesting and consumption on the island of Newfoundland.

3.1 Wood Burning

Prevalence of Wood Burning

Wood was used as a source of partial or total heat, or for aesthetic reasons, by 46% of the respondents at their residence; and by 8% of the respondents at a cabin.

In 1983, the average annual consumption of all types of wood (softwood, hardwood, and scrapwood) by wood burning respondents at residence and cabin was 12.9 solid m^3 and 3.0 solid m^3 respectively.

Based on the results of this survey, it is estimated that

there were 65,451 wood burning households on the island of Newfoundland in 1983. The estimated volume of fuelwood consumed by these households in 1983 was 820,004 solid m^3, comprised of softwood 596,925 solid m^3 (73%), hardwood 178,750 solid m^3 (22%), and scrapwood 44,329 solid m^3 (5%).

Amount of Household Heat from Wood

Forty percent of wood burning respondents heated their homes entirely with wood. Approximately half of this number (24%) reported no other source of heat in the household.

Fewer households (25%) are heated by wood in the Eastern Region than elsewhere on the island. The presence of St. John's in this region likely accounts for this.

Type of Wood Burning Unit

Among the respondents who reported burning wood at their residences, the single most common type of equipment used was the wood burning stove; on an all unit-all strata basis, 64% of the households used stoves only. Only 9% of the households used a fireplace only.

The present study also showed that there was a considerable increase in the percentage of survey households with wood or wood/oil furnaces (18-20%, including all categories in which "furnace" can appear), compared with the 1978 findings of 3-5%.

3.2 Procurement of Fuelwood by Householder

Acquisition

Seventy-seven percent of the fuelwood consumed on the island of Newfoundland in 1983 was cut by the householder.

Source of Wood

The wood used by wood burning households was harvested primarily from Crown Land. The sources of wood are:

Crown Land	78% of households
Private land	13% of households
Paper company land	9% of households

Distance Travelled to Harvest Wood

Fifty percent of wood burning respondents travelled up to 8 km to harvest wood. Distances up to 40 km were travelled by 41% of respondents, and 8% went more than 40 km. Households in the high wood burning strata obtained their wood nearer home than households in either the medium or low strata.

Fuelwood Retailers

In 1983, from 5-10% of wood burning householders purchased fuelwood from commercial retailers. At present, there are approximately 100 retailers on the island, and this number is likely to increase somewhat in the next two or three years if the comments from the retailer interviews are accurate.

Average 1983 prices for fuelwood were:

	Per pick-up load	Per cord	Per solid m^3
Hardwood	$42.32	$67.31	$27.96
Softwood	36.08	52.02	21.61
Scrapwood	11.47	27.22	11.31

Total amount spent by householders for fuelwood on the island in 1983 was approximately $2,000,000.

4. DISCUSSION

From 1975/76 to 1982/83, the number of domestic cutting permits issued annually by forestry offices across the island increased from 5,304 to 27,534 - an increase of 419%. This reflects the determination of householders to reduce their dependence on oil and electric heat, both of which began to rise dramatically in price about 1972 (Northland Associates Ltd., 1980).

The year-to-year rate of increase in the total number of domestic cutting permits issued has levelled off. There were 31% more permits issued in 1976/77 than in 1977/78, but only 17% more in 1982/83 than 1981/82. This levelling off likely also reflects a levelling of in the prices of heating oil and electricity, both of which have shown less dramatic year-to-year increases since the early 1980s. Also, by 1981 and 1982 the majority of households contemplating a move to wood heat had probably done so.

While the demand for fuelwood appears to be levelling off (at least in some parts of the island), the number of wood burning households and the volume of fuelwood consumed on the island in 1983 were both substantially higher than in 1978. This present (1983) study indicates that there are approximately twice as many wood burning households, consuming approximately two and a half times as much wood as in 1978. This has given rise to a concern that the forest resource, particularly on the Avalon Peninsula (Unit 1), may undergo some damage as a result of fuelwood cutting activities. Generally however, for the remainder of the island, the resource appears capable of supplying the demand for fuelwood, particularly if proposed management plans directed at this activity are adopted. This optimism appears warranted even though softwood harvesting for fuel accounts for about one quarter of the possible volume of softwood harvested annually (including for pulp and paper and sawlogs) from the island's forest lands.

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1. INTRODUCTION

Fuelwood has always been a traditional source of domestic heat energy in Newfoundland. While the rate of use probably leveled off or declined with the increased urbanization of the population in the 1950s and 1960s (Northland Associates Ltd., 1980), it began to rise sharply again in the 1970s in response to dramatic increases in the price of oil and electricity. Homes that had some sort of wood burning appliances began using wood more intensively. And, the sales of wood burning appliances to both new and existing homeowners reached an all-time high.

While the increased popularity of fireplace inserts, wood stoves, and wood furnaces has been widely reported in the media, very little quantified data are available on the prevalence of wood burning equipment or on the volume of fuelwood consumed. The Newfoundland and Labrador Department of Forest Resources and Lands is particularly concerned about the latter. The demand for wood for domestic heating has escalated to the point where cutting is close to being uncontrolled in some areas. Also, there appears to be some potential for deterioration of the forest resource on Crown Lands, particularly in the vicinity of communities, as a result of firewood cutting.

A previous survey of domestic fuelwood consumption in Newfoundland was completed in 1979 and provided estimates for most of the island (Northland Associates Ltd., 1980). However, in that earlier survey the sample size was small, and the Avalon Peninsula (where the demand for fuelwood is perhaps greatest), was not adequately sampled. In the absence of a province-wide monitoring system for quantifying fuelwood consumption, the Canadian Forestry Service has commissioned this study to update the estimates for current and future demands for domestic fuelwood on the island of Newfoundland. Additional, but related information would be collected at the same time.

The objectives of the study are:

- To investigate the current and future demands for domestic fuelwood for the island of Newfoundland, with special emphasis on the Avalon Peninsula.

- To interview unit foresters for the purpose of gaining additional insight into fuelwood supply and demand in each unit.

- To identify and interview commercial fuelwood retailers on the island.

- To assess the fuelwood drain on the Avalon Peninsula.

In order to best fulfill the objectives, the study was divided

into four phases:

Phase 1: Household Surveys

Phase 2: Survey of Unit Foresters

Phase 3: Survey of Commercial Fuelwood Retailers

Phase 4: Assessment of Avalon Peninsula Fuelwood inventory to determine the drain between 1978 and 1982.

Phase 4 will be submitted as a separate volume. However, a short summary of this phase is included in this report.

2. METHODS

2.1 Survey Methods

For provincial forestry administrative purposes, the island of Newfoundland is divided into 18 forestry management units and three forestry management regions (Figure 1). The 15 units which are populated (Units 1-3, 5, 7-12, 14-18) are the focus of this study; fuelwood cutting is considered negligible in the remaining three units (4, 6, 13). Gros Morne National Park (Figure 1) was also sampled in this survey since domestic fuelwood harvesting is permitted in certain areas of the park.

The procedures used in carrying out each phase of the study are described below.

2.1.1 Phase 1: Household Surveys

Using information from the 1979 survey (Northland Associates Ltd., 1980) and in close consultation with forestry personnel in the forest management units, each of the 15 populated management units was stratified for sampling purposes. In the stratification process, communities in each unit were assigned to one of the following strata:

Low - 0 to 33% of households burn wood
Medium - 34 to 66% of households burn wood
High - 67 to 100% of households burn wood

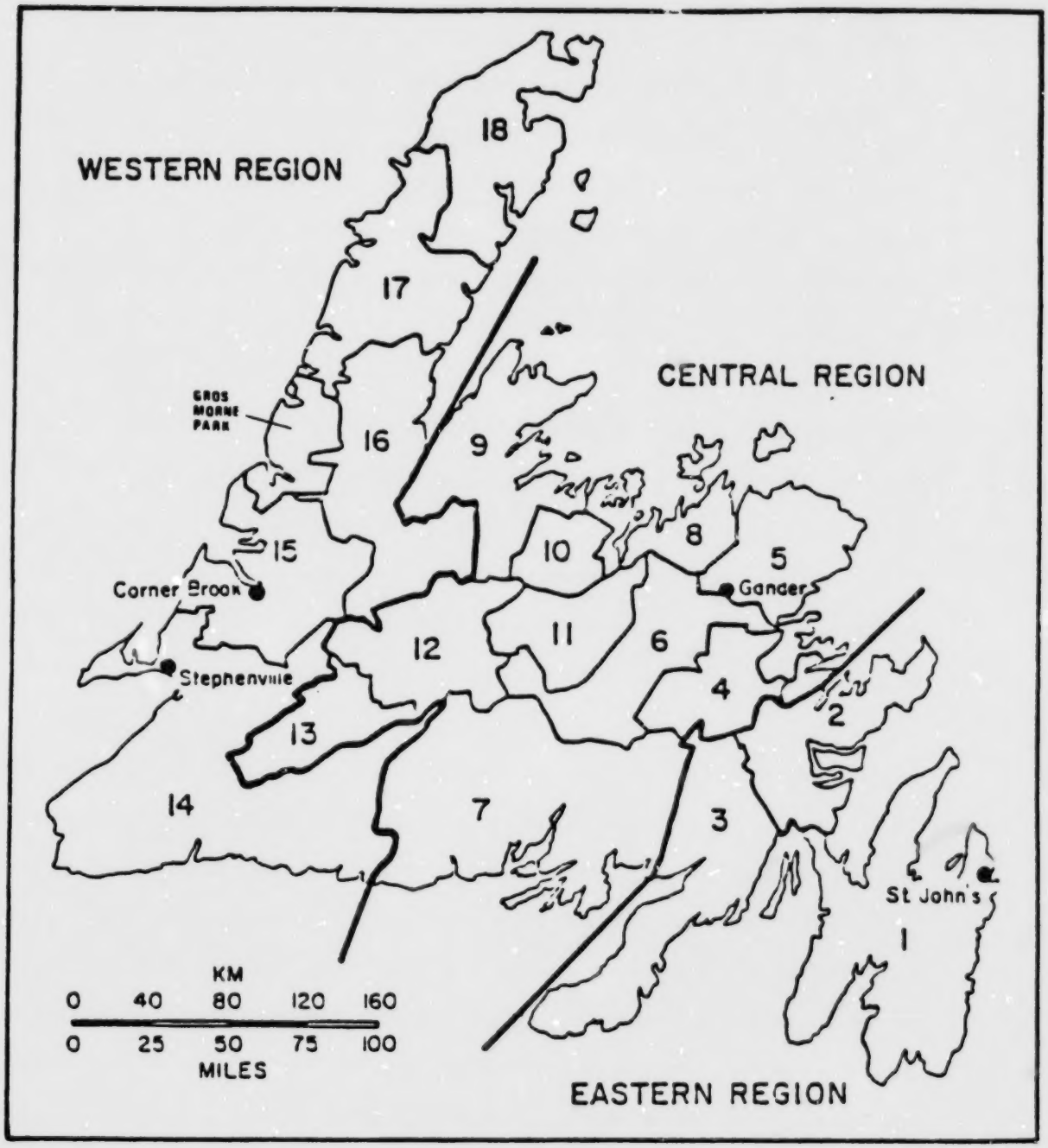

Figure 1. Newfoundland forest management units and administrative regions (From Department of Forest Resources and Lands).

Considerable time and effort were expended in the stratification process, and it is felt that the results achieved are reliable. A review of the stratum listings (Appendix 1) will show some changes from the 1979 survey. However, it is likely that an analysis of the findings on a community by community basis will reveal that some communities may still need to be reassigned for future surveys.

The stratification process resulted in a total of 35 strata within 14 units (including Gros Morne National Park) to be sampled. Units 10, 11, and 12 were combined since the population was essentially present only in Unit 10, with fuelwood cutting mostly confined to the remaining two units. Also, not all of the 14 units contained three strata.

When the strata had been established, the households to be sampled in each stratum were selected from current telephone directories. All of the pages containing the household listings for the communities in a particular stratum and unit were consolidated into one "pool." For the larger towns, pages were chosen randomly (table of random numbers) and names were selected from the pages systematically. For the smaller communities, households were chosen systematically from each page of the various telephone exchanges in the pool. Since several smaller communities are listed in one exchange, a community

was occasionally missed in the selection procedure. However, this was not a common occurrence. For every stratum, all of the larger towns and at least 90% of the smaller communities present are represented in the sample for that stratum.

The total number of households required for both survey methods (mailed questionnaire and telephone interviews) were selected at one time. Households were then selected randomly for each survey procedure from this pool of names.

Initially there was some concern that exclusive use of the telephone directories to select households for sampling might introduce a bias to the sample. However, discussion with both Newfoundland Telephone (Eastern and Central Newfoundland Directory, Western Newfoundland Directory) and Terra Nova Tel (one untitled directory) indicated that the telephone directories provide access to 97+% of the households on the island. This was considered to be an acceptable access rate for the survey.

Households in the 35 strata were sampled by mailed questionnaire and by telephone interview. A questionnaire was designed and tested in 10 of the strata. Based on this test, the questionnaire was revised to eliminate confusing words or phrases, and to streamline it as much as possible. The final

questionnaire is shown in Appendix 2. The telephone interviews were conducted using this same questionnaire.

Mailed questionnaires were sent to 6,000 households, and 4,000 households were selected for telephone interviews. Each of the 35 strata was sampled by a proportional allocation of samples based on the population of the stratum. For example, if a stratum contained 10% of the households on the island, it received 10% (600) of the questionnaires and 10% (400) of the telephone interviews.

The mailed questionnaire package included the form itself, a letter of explanation, notice of eligibility for a draw of one of four incentive prizes if the questionnaire was returned, and a stamped, addressed return envelope. (A Canada Post bulk mailing scheme was used.) All 6,000 questionnaires were mailed on 5 December 1984.

Telephone interviews were conducted in the standard manner. If there was no answer to the call, two call-backs were attempted, each at a different time period (morning, afternoon, night). After two call-backs without a response, the household was dropped from the survey and replaced by another.

A telephone follow-up survey was conducted among those householders who had not replied to the mailed questionnaire. A

total of 926 calls were made on a proportional allocation basis to the 35 strata. Since the follow-up was primarily intended to determine if there were differences in wood burning habits between respondents and non-respondents, only some of the questions were used. These questions are indicated in Appendix 2.

Response Bias

Follow-up interviews with non-respondents to the mail questionnaire showed that 34% of these individuals used wood. This is a much lower user rate than the 66% shown by respondents to the mail questionnaire. When asked why they had not responded to the mail survey, a number of non-respondents indicated that since they did not burn wood (or used only a small amount) they did not consider it important to reply. Thus, the smaller annual average consumption rate of wood at non-respondents' residences (11.0 solid m^3 compared with the average of 12.6 solid m^3 for telephone interview households and 13.1 solid m^3 for mail questionnaire households) was not unexpected.

The 34% wood burners among the follow-ups was considered to be representative of all 3,414 non-respondents to the mail survey. This percentage was given equal weight with the mail and telephone survey results when estimating the number of wood burning households on the island in 1983. However, the

results of the telephone follow-up of non-respondents to the mail questionnaire were not used as the basis for making an adjustment to wood volume consumption estimates. A number of these individuals suggested that they had very poor judgment in estimating the amount of wood burned. Others stated that they had little interest in the survey, but agreed to provide some answers since the extra follow-up effort had been made. Consequently, we question the reliability of volume-related responses in the follow-up.

Also, no adjustments were made to consumption estimated from the mail and telephone surveys. For any given management unit, the difference between $\bar{X}_m - \bar{X}_t$ (the means of the mail and telephone volume data) is not significantly large. Thus, the results of each survey were used in this report in a combined unweighted manner.

Data Analysis

Mailed questionnaires returned to our office were cross referenced on the master lists, sorted by unit and stratum, edited, and keyed into a computer. The same procedure was followed with the completed telephone interviews, and with the follow-up interviews of non-respondents to the mailed questionnaire.

A total of 6,713 households were surveyed by mail questionnaire, telephone interview and follow-up phone call. The breakdown is as follows:

Mail questionnaire	-	2,586 households (43.10% return)
Telephone interview	-	3,201 households
Follow-up telephone interviews	-	926 households
		6,713 households

The consumption estimates for the island were based on the number of solid m^3 burned at respondents' residences and cabins. As previously stated, no weighting adjustment was made to the survey data.

Eight percent of all respondents reported owning or using a cabin at which wood was used. A total of 538 cabins were reported. On a regional basis the distribution was:

Eastern Region	200
Central Region	178
Western Region	160

For purposes of this survey, cabins were listed under the unit and stratum in which they were located. This was frequently not in the unit and stratum where the respondent maintained his residence, particularly when the residence was in a larger centre such as St. John's, Mount Pearl or Corner Brook.

Seventy-eight of the cabins (15%) were in Low Strata, 130 (24%) in Medium Strata, and 330 (61%) in High Strata locations.

Data Presentation

Data were retrieved from the computer by strata within management unit. Presentation of all results in similar fashion in

this report would have resulted in numerous multi-page tables and a massive, difficult document. Consequently, we selected certain information (eg. most volume data) for the more detailed "management unit and stratum" presentation, while tabulating other data by "management unit" only.

The 328 pages of computer print-out tables have been bound as a separate volume to accompany this report.

2.1.2 Phase 2: Survey of Unit Foresters

Personal and/or telephone interviews were conducted with each of the 14 unit foresters on the island. In addition, a written request for information relating to fuelwood harvesting and use was sent to each forester. The unit foresters are identified and the information requested is outlined in Appendix 3. Since fuelwood is also harvested on the land controlled by Bowater Newfoundland Ltd., Abitibi-Price Inc., and within Gros Morne National Park, requests for information on fuelwood cutting in these areas were sent to appropriate authorities in each.

2.1.3 Phase 3: Survey of Commercial Fuelwood Retailers

Personal or telephone interviews were conducted with a small number of fuelwood retailers. Because these individuals were frequently away from home, the interview approach was abandoned in favour of a mailed request for information. This questionnaire was sent to the 79 fuelwood retailers identified by unit foresters. Appendix 4 contains a copy of this questionnaire.

3. RESULTS: PHASE 1 (HOUSEHOLD SURVEYS)

3.1 Wood Burning

The results of the mail questionnaire, telephone interviews and telephone follow-ups were combined to provide information on most aspects of domestic fuelwood harvesting and consumption in insular Newfoundland. Except where specifically noted, the descriptions which follow are based on the unweighted responses of the 6,713 respondents who participated (either by mail or by telephone) in the survey. Response is shown in Table 1.

3.1.1 Prevalence of Wood Burning

Wood was used as a source of partial or total heat, or for aesthetic reasons, by 46% of the respondents. The number of wood burning survey households in each unit and each stratum is shown in Table 2. In each of the three forest management regions, the units containing the largest centres of population (Units 1, 10-12, and 14) show the lowest percentages of wood burning households. As was expected, rural areas have the highest percentage of wood burning households.

Table 3 shows the percentage of household heat obtained from wood. This table also indicates the percentage of households surveyed which use wood as the only source of heat. The general pattern displayed here is that the highest number of households heating mainly or entirely with wood are in the

TABLE 1. Survey response

Unit	Number of households: Stratum: Low	Medium	High	Unit total	Mail questionnaires: Low stratum: Mailed	Returned	Medium stratum: Mailed	Returned	High stratum: Mailed	Returned	Unit total returned	Telephone interviews[4]: Stratum: Low	Medium	High	Unit total	Households surveyed by mail or telephone[4]: Stratum: Low	Medium	High	Unit total	% of[5] unit target
1	28,080	17,350	19,113	64,543 (68.0)[1]	1,193	300 (25)[2]	737	249 (34	812	392 (48	941 (34)	522	354	449	1,325	822 (41)[3]	603 (49)	841 (62)	2,266	50
2	2,879	3,759	1,277	7,915 (5.6)	122	43 (35)	180	94 (50)	54	22 (41)	159 (47)	72	83	22	177	115 (56)	177 (67)	44 (49)	336	60
3	1,497	4,864	917	7,278 (5.1)	64	27 (42)	257	99 (48)	39	19 (49)	145 (47)	41	115	21	177	68 (64)	214 (62)	40 (62)	322	22
5	2,950	1,610	5,231	9,791 (6.9)	125	50 (40)	68	31 (46)	222	127 (57)	208 (50)	73	37	137	247	123 (59)	68 (60)	264 (71)	455	66
7	348	1,240	1,119	2,705 (1.9)	15	9 (60)	53	29 (55)	48	31 (66)	69 (59)	9	29	28	66	18 (72)	58 (66)	59 (75)	135	70
8	-	3,269	5,166	8,435 (5.9)	-	-	139	75 (54)	219	137 (63)	212 (59)	-	78	128	206	-	153 (66)	265 (73)	418	70
9	-	600	4,375	4,975 (3.5)	-	-	25	9 (36)	186	111 (60)	120 (57)	-	13	110	123	-	22 (52)	221 (71)	243	69
10/11																				
12	4,102	1,896	88	6,086 (4.2)	174	80 (46)	80	44 (55)	3	2 (67)	126 (49)	91	55	2	148	171 (59)	99 (74)	4 (80)	274	64
14	746	7,310	2,842	10,898 (7.7)	32	23 (72)	351	125 (40)	121	80 (66)	228 (49)	19	185	74	278	42 (79)	310 (60)	154 (77)	506	66
15	8,041	2,125	31	10,197 (7.2)	341	139 (41)	90	41 (46)	1	1 (100)	181 (42)	181	53	1	235	320 (56)	94 (56)	2 (100)	416	58
16	-	1,150	1,100	2,260 (1.6)	-	-	49	22 (45)	47	25 (53)	47 (49)	-	38	27	65	-	60 (73)	52 (67)	112	70
17	645	852	-	1,497 (1.1)	28	14 (50)	36	20 (56)	-	-	34 (53)	15	21	-	36	29 (63)	41 (68)	-	70	66
18	-	785	2,527	3,322 (2.3)	-	-	34	17 (50)	107	62 (58)	79 (56)	-	23	60	83	-	40 (71)	122 (68)	162	69
Gros Morne	-	1,423	-	1,423 (1.0)	-	-	61	37 (61)	-	-	37 (61)	-	35	-	35	-	72 (71)	-	72	71
TOTALS	49,288	48,253	43,786	141,305 (100)	2,094	885 (33)	2,050	892 (44)	1,859	1,009 (54)	2,586 (43)	1,023	1,119	1,059	3,201	1,709 (49)	2,011 (59)	2,088 (67)	5,787	58

1 = percent of total island households

2 = percent of return

3 = percent of target households in stratum surveyed by either mail questionnaire or telephone

4 = not including follow-up calls to mail questionnaire non-respondents

TABLE 2. Number of wood burning households, island of Newfoundland, 1983

Region	Unit	Stratum	Total no. households	% burning wood*	Estimated no. wood burning households	Estimated % wood burning households in unit
Eastern	1	High	19,113	56	10,703	
		Medium	17,350	36	6,246	35
		Low	28,080	20	5,616	
			64,543		22,565	
	2	High	1,277	86	1,098	
		Medium	3,759	76	2,857	73
		Low	2,879	64	1,843	
			7,915		5,798	
	3	High	917	63	578	
		Medium	4,864	39	1,897	43
		Low	1,497	46	689	
			7,278		3,164	
Central	5	High	5,231	74	3,871	
		Medium	1,610	41	660	56
		Low	2,950	33	974	
			9,791		5,505	
	7	High	1,119	68	761	
		Medium	1,240	59	732	63
		Low	346	63	218	
			2,705		1,711	
	8	High	5,166	87	4,494	
		Medium	3,269	57	1,863	75
			8,435		6,357	
	9	High	4,375	83	3,631	
		Medium	600	82	492	83
			4,975		4,123	

TABLE 2. Number of wood burning households, island of Newfoundland, 1983 (Cont.)

Region	Unit	Stratum	Total no. households	% burning wood*	Estimated no. wood burning households	Estimated % wood burning households in unit
	10-12	High	68	67	46	
		Medium	1,896	40	758	37
		Low	4,102	35	1,436	
			6,066		2,240	
Western	14	High	2,842	68	1,933	
		Medium	7,310	32	2,339	41
		Low	746	22	164	
			10,898		4,436	
	15	High	31	100	31	
		Medium	2,125	68	1,445	40
		Low	8,041	33	2,654	
			10,197		4,130	
	16	High	1,100	51	561	
		Medium	1,160	69	800	60
			2,260		1,361	
	17	Medium	852	74	630	
		Low	645	86	555	79
			1,497		1,185	
	18	High	2,527	69	1,744	
		Medium	795	35	278	61
			3,322		2,022	
Gros Morne		Medium	1,423	60	854	60
			141,305		65,451	46%**

* from results of this survey

** Estimated percentage of households burning wood on the island of Newfoundland in 1983

TABLE 3 Percentage of household heat from wood

Region	Unit	Stratum	Heating percentage 25%	50%	75%	100%	Aesthetic	No other heat source
Eastern	1	High	76 (15)*	109 (22)	136 (27)	159 (31)	25 (5)	87 (18)
		Medium	69 (23)	68 (23)	64 (22)	51 (17)	45 (15)	13 (4)
		Low	54 (20)	24 (9)	22 (8)	16 (6)	160 (58)	5 (2)
	2	High	2 (4)	10 (21)	14 (30)	20 (43)	1 (2)	9 (22)
		Medium	11 (7)	25 (17)	42 (28)	62 (42)	7 (5)	36 (26)
		Low	12 (18)	18 (27	17 (27)	15 (23)	4 (6)	0 (0)
	3	High	3 (10)	10 (33)	7 (23)	10 (33)	0 (0)	6 (21)
		Medium	22 (21)	25 (24)	26 (25)	31 (29)	2 (2)	20 (19)
		Low	10 (30)	9 (27)	7 (21)	7 (21)	0 (0)	2 (6)
Central	5	High	14 (6)	31 (14)	63 (29)	107 (49)	4 (2)	69 (34)
		Medium	5 (12)	11 (26)	8 (19)	15 (35)	4 (9)	6 (14)
		Low	9 (17)	8 (15)	22 (42)	7 (13)	7 (13)	4 (8)
	7	High	2 (4)	6 (13)	6 (13)	29 (64)	2 (4)	15 (39)
		Medium	0 (0)	5 (12)	8 (20)	25 (61)	3 (7)	12 (32)
		Low	1 (8)	3 (23)	4 (31)	5 (38)	0 (0)	2 (17)
	8	High	7 (3)	27 (10)	41 (16)	180 (70)	2 (1)	126 (54)
		Medium	5 (5)	21 (20)	26 (25)	46 (45)	5 (5)	20 (20)
	9	High	1 (.5)	17 (9)	57 (29)	120 (61)	1 (.5)	69 (39)
		Medium	2 (1)	3 (14)	5 (24)	11 (52)	0 (0)	6 (38)
	10-12	High	0	0	0	2 (100)	0	1 (33)
		Medium	1 (2)	10 (19)	11 (20)	32 (59)	0	22 (40)
		Low	6 (8)	14 (19)	21 (28)	30 (40)	4 (5)	16 (22)
Western	14	High	4 (4)	13 (11)	11 (10)	32 (28)	0	52 (47)
		Medium	13 (11)	24 (20)	30 (25)	47 (39)	5	27 (23)
		Low	0	2 (18)	4 (36)	5 (46)	0	4 (33)
	15	High	0	0	0	1 (100)	0	1 (100)
		Medium	3 (4)	12 (16)	13 (17)	44 (59)	3 (4)	24 (36)
		Low	26 (19)	25 (18)	24 (17)	44 (31)	21 (15)	21 (15)
	16	High	3 (9)	4 (11)	6 (17)	22 (63)	0	16 (47)
		Medium	4 (8)	13 (27)	4 (8)	26 (53)	2 (4)	17 (38)
	17	Medium	2 (6)	4 (11)	12 (34)	17 (49)	0	12 (38)
		Low	4 (16)	3 (12)	2 (8)	16 (64)	0	10 (42)
	18	High	5 (5)	12 (12)	32 (32)	48 (48)	2 (2)	25 (27)
		Medium	2 (10)	7 (35)	7 (35)	4 (20)	0	2 (10)

*percent in ( )

rural areas of the island. Also, the difference between strata is evident.

On a regional basis, the Central Region has the largest percentage both of wood burners and householders with no other source of heat. The figures for the three regions are:

	East	Central	West
% of wood burning households	40	62	47
% with no other source of heat	12	34	30

The use of a wood stove, fireplace or furnace at a cabin was reported by 7% of the respondents.

.1.2 Quantity of Wood Burned

The quantity of wood burned by survey respondents at residence and cabin during 1983 was 39,319 solid m^3. The majority of this, 37,893 m^3 or 96.4%, was burned at residences and the remainder, 1,425 solid m^3 (3.6%) at cabins.

The total volume of wood burned on the island of Newfoundland during this same period is estimated to be 820,004 solid m^3 (residences 790,484 m^3 or 96.4%; cabins 29,520 m^3 or 3.6%). These are stratified estimates and are within 10% of the actual volume consumed.

Tables 4 and 5 show consumption data by stratum and unit, and by wood type for the survey households and for the island of Newfoundland (extrapolated from the survey results).

3.1.3 Average Amount Burned

The average amounts of wood burned at residence and cabin by respondents to the mail and telephone surveys are shown by unit in Table 6.

The average consumption of wood type per household for each strata is shown below:

	Softwood	Hardwood	Scrapwood	Total
High stratum	12 m^{3*}	3	1	16
Medium stratum	9	3	1	12
Low stratum	4	4	1	8

$^{*}m^3$ = solid m^3

TABLE 4. Fuelwood consumption of wood burning respondents, by unit and stratum, 1983

Region	Unit	Stratum	Softwood solid m^3	Hardwood solid m^3	Scrapwood solid m^3	Stratum totals solid m^3	Unit totals all types solid m^3
Eastern	1	High	4,451	375	269	5,095	
		Medium	1,800	257	161	2,218	
		Low	609	256	505	1,370	8,683
	2	High	387	67	79	533	
		Medium	1,251	183	134	1,568	
		Low	218	59	50	327	2,428
	3	High	315	66	12	393	
		Medium	1,103	143	42	1,288	
		Low	228	40	-	268	1,949
Central	5	High	211	376	131	2,618	
		Medium	288	79	14	381	
		Low	273	273	19	565	3,564
	7	High	582	169	30	781	
		Medium	434	146	21	601	
		Low	79	22	10	111	1,493
	8	High	3,422	882	237	4,541	
		Medium	689	394	91	1,174	5,715
	9	High	2,600	975	148	3,723	
		Medium	132	60	19	211	3,934
	10-12	High	16	17	-	33	
		Medium	299	412	74	785	
		Low	212	645	28	885	1,703
Western	14	High	1,571	418	70	2,059	
		Medium	1,058	379	43	1,480	
		Low	112	27	12	151	3,690
	15	High	2	28	-	30	
		Medium	486	312	84	882	
		Low	376	690	123	1,189	2,101
	16	High	331	187	59	577	
		Medium	243	194	28	465	1,042
	17	Medium	320	171	15	506	
		Low	187	119	3	309	815
	18	High	1,286	113	78	1,477	
		Medium	215	32	18	265	1,742
Gros Morne		Medium	545	299	68	912	912

TABLE 5. Estimated 1983 fuelwood consumption by unit and stratum, island of Newfoundland

Region	Unit	Stratum	Consumption (solid m^3) Softwood	Hardwood	Scrapwood	Unit totals (solid m^3)
Eastern	1	High	105,826	8,588	5,564	119,977
		Medium	44,368	6,226	3,907	54,501
		Low	14,134	6,195	1,206	21,536
			164,328	21,009	10,677	196,014
	2	High	11,524	1,990	2,406	15,920
		Medium	26,966	3,932	2,819	33,717
		Low	8,919	2,529	2,066	13,514
			47,409	8,451	7,291	63,151
	3	High	7,283	1,611	200	9,095
		Medium	20,820	2,793	421	24,034
		Low	5,578	1,028	0	6,606
			33,681	5,432	621	39,735
Central	5	High	43,602	7,359	2,539	53,500
		Medium	4,687	1,293	193	6,173
		Low	5,103	5,201	363	10,666
			53,392	13,853	3,095	70,339
	7	High	11,401	3,301	587	15,289
		Medium	9,450	3,204	470	13,124
		Low	2,137	577	262	2,976
			22,988	7,082	1,319	31,389
	8	High	67,360	16,767	4,121	88,249
		Medium	13,309	7,564	1,756	22,628
			80,669	24,331	5,877	110,877
	9	High	51,481	19,252	2,647	73,381
		Medium	4,036	1,747	596	6,379
			55,517	20,999	3,243	76,760

TABLE 5. Estimated 1983 fuelwood consumption by unit and stratum, island of Newfoundland (Cont.)

Region	Unit	Stratum	Consumption (solid m^3) Softwood	Hardwood	Scrapwood	Unit totals (solid m^3)
	10-12	High	365	321	0	686
		Medium	4,261	5,595	1,013	10,869
		Low	4,265	13,362	594	18,221
			8,891	19,278	1,607	29,776
Western	14	High	28,521	7,619	1,047	37,188
		Medium	23,463	8,112	739	32,314
		Low	1,378	326	151	1,855
			53,362	16,057	1,937	71,357
	15	High	0	618	0	618
		Medium	11,607	7,454	2,012	21,073
		Low	7,424	13,922	2,458	23,803
			19,031	21,994	4,470	45,494
	16	High	5,157	2,502	909	8,568
		Medium	4,656	3,671	359	8,686
			9,813	6,173	1,268	17,254
	17	Medium	6,884	3,770	326	10,980
		Low	4,929	3,145	89	8,163
			11,813	6,915	415	19,143
	18	High	24,332	2,158	1,174	27,664
		Medium	3,125	472	268	3,864
			27,457	2,630	1,442	31,528
Gros Morne			8,574	4,546	1,067	14,187
Totals			596,925	178,750	44,329	820,004

TABLE 6. Average annual consumption of fuelwood (all types) at residence and cabin, by unit

Region	Unit	Residence*	No. of respondents	Cabin*	No. of respondents
Eastern	1	8.7	916	2.7	108
	2	11.3	209	2.2	26
	3	13.1	140	3.8	29
Central	5	12.6	271	2.7	52
	7	18.5	79	2.0	14
	8	17.4	319	3.2	52
	9	19.6	195	5.3	21
	10-12	13.4	121	3.1	26
Western	14	16.2	218	2.6	56
	15	10.8	190	2.2	22
	16	13.0	72	2.7	38
	17	16.2	48	3.3	11
	18	15.5	108	4.4	15
Gros Morne		16.6	53	5.2	6

*Solid m^3

3.1.4 Year Began Burning Wood

Almost one quarter (23%) of the households that used wood indicated that they began burning wood prior to 1974. A relatively small proportion of households began to burn wood each year from 1974 to 1977. In 1978, and continuing to 1981, substantially more households began each year. A leveling off began in 1982 and continued in 1983. This pattern was fairly consistent in all units (Table 7).

Respondents were asked if the amount of wood burned in 1982-83 was more than, less than or the same amount as when they first started using wood. On an all unit-all strata basis, 24% burned more wood, 12% used less, and 64% used the same amount. These percentages were quite consistent in all three forest management regions. Also, the same percentages were observed within strata.

TABLE 7. Year survey households began burning wood

	Percentage of households										
Unit	Before 1974	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1	25	1	2	3	4	7	9	13	12	14	10
2	30	1	2	3	2	6	10	13	13	10	9
3	29	1	2	1	1	4	9	18	18	10	7
5	26	2	2	1	4	6	10	14	15	10	10
7	33	2	0	2	4	2	8	11	12	14	12
8	25	1	5	4	3	9	9	14	10	12	8
9	27	1	2	4	5	6	11	15	13	6	10
10-12	4	0	0	2	3	11	21	20	9	16	14
14	23	2	2	3	5	6	9	12	16	13	9
15	10	1	2	2	5	9	9	17	15	16	14
16	17	0	4	1	4	6	13	17	14	8	16
17	16	0	0	2	2	5	11	20	20	12	12
18	23	1	4	2	2	3	9	18	13	16	9

3.1.5 Fuel Replaced by Wood

Wood burning households were asked to indicate what fuels, either alone or in combination with other fuels, had been used prior to using wood. While 22% of the present wood burners had always used wood, almost half (46%) had previously used oil, 29% had used electricity and 2% coal. Most respondents are now using wood heating to complement an oil furnace or electric heat rather than as a total substitute for oil or electric heat. Although 24% of the households surveyed heat entirely with wood (Section 3.1.7), 33% have an oil furnace and 36% heat (at least partially) with electricity.

Table 8 provides information on the fuel replaced by wood in each management unit.

TABLE 8. Fuel used by wood burning households before began using wood

Region	Unit	Always wood	Oil	Electricity	Coal
Eastern	1	18%	40%	37%	4%
	2	27	41	29	2
	3	19	44	30	6
Central	5	27	45	25	3
	7	33	38	24	3
	8	26	48	23	2
	9	27	54	18	1
	10-12	11	50	39	0
Western	14	29	50	20	1
	15	14	50	34	1
	16	17	49	33	0
	17	20	48	33	0
	18	13	82	3	2

3.1.6 Type of Wood Burning Equipment

In reporting the findings on the type of wood burning equipment used in survey households, we have restricted the discussion to the categories of wood burning appliances: "fireplaces," "stoves" and "furnaces." There was a total of nine possible answers to be checked in these three categories (eg. "stove" - airtight, non-airtight, wood/oil). Without the restriction, computer-related costs (key punching, program development, and retrieval) for this question alone would have been prohibitive.

Among the respondents who reported burning wood at their residences, the single most common type of equipment used was the wood burning stove; on an all management unit-all strata basis 64% of the households used stoves only. On an island-wide basis, the percentage of wood burning survey households using particular types of wood burning equipment is shown below:

Stove only	64%
Furnace only	18%
Fireplace only	9%
Fireplace and stove	4%
Fireplace and furnace	2%
Furnace and stove	2%
Fireplace, furnace and stove	1%

A detailed breakdown (by unit and stratum) of the type of wood burning equipment used in survey households across the island

is presented in Table 9. It is interesting to note that fireplaces are not common except in Unit 1, Low Stratum (St. John's, Mount Pearl, Wedgewood Park). This is in marked contrast to the Ontario findings (White et al., 1981) which showed the fireplace to be the most common type of equipment used (53%) in that province. However, a Prince Edward Island study (Resource Ventures, 1983) reports fireplaces are not important (2%), and declining in use.

In Newfoundland in 1977-78 (Northland Associates, 1980), fireplaces constituted 6% of the wood burning equipment in use. However, this earlier study did not include results from the St. John's area, where fireplace use is high. Thus the findings of this present survey (9% fireplace use overall) probably represents a decline in fireplace use since 1977-78.

It is also interesting to note the considerable increase in the percentage of survey households with wood or wood/oil furnaces during this present survey (18-20%, including all categories in which "furnace" can appear) compared with the 1977-78 findings of 3-5%.

In the information presented for cabins, the wood burning stove was also the most common type of wood burning equipment used. Eighty-four percent of the cabins were equipped with a stove only, 8% with a fireplace only, 2% with a furnace only, and 6% with a fireplace and a stove.

TABLE 9. Type of wood burning unit in survey household

Region	Unit	Stratum	Fireplace only	Furnace only	Stove only	Furnace and stove	Fireplace and stove	Furnace and fireplace	Fireplace, furnace and stove
Eastern	1	H	3%	16%	73%	2%	4%	1%	1%
		M	17	6	62	2	9	2	1
		L	60	2	26	1	8	3	0
	2	H	2	21	70	0	2	2	0
		M	3	21	71	1	3	0	1
		L	3	10	75	3	6	1	0
	3	H	3	10	77	10	0	0	0
		M	5	16	74	3	1	1	1
		L	0	0	85	6	6	0	0
Central	5	H	1	18	74	4	1	2	1
		M	7	9	77	1	1	0	0
		L	8	19	57	0	9	8	0
	7	H	1	18	73	1	0	0	0
		M	5	12	78	2	2	0	0
		L	8	8	85	0	0	0	0
	8	H	0	23	72	2	2	1	0
		M	4	25	63	1	7	1	0
	9	H	1	28	66	4	2	0	0
		M	0	24	71	0	5	0	0
	10-12	H	0	0	50	0	50	0	0
		M	2	17	76	0	2	4	0
		L	5	31	55	0	8	1	0
Western	14	H	1	12	82	4	0	1	0
		M	4	13	76	2	3	3	0
		L	0	27	64	0	9	0	0
	15	H	0	0	100	0	0	0	0
		M	4	34	55	3	1	3	1
		L	11	26	53	1	6	4	0
	16	H	6	31	49	9	3	3	0
		M	2	16	69	0	10	2	0
	17	M	0	31	60	0	0	6	0
		L	0	36	64	0	0	0	0
	18	H	2	37	49	8	1	3	0
		M	5	45	45	0	0	5	0

3.1.7 Other Source of Heat

Twenty-four percent of the wood burning households surveyed reported no other source of heat in the household. Of the 76% of the households that did have other sources of heat, oil furnaces and electric heat were the most frequent. Table 10 contains the information on other sources of heat in the households surveyed.

3.1.8 Future Intentions

Respondents were asked if they intended to burn wood during the next 12 months. Fifty-six percent indicated they planned to use wood. This figure includes those present wood burners who plan to continue, plus those present non-burners who plan to begin.

The returns also indicated that 44% of the households surveyed did not plan to burn wood next year. Included in this figure are some households which do not use wood at present, plus a number of present wood burners who do not intend to continue.

These figures are perhaps more revealing when viewed from a stratum perspective. In the high stratum (all high strata of all management units combined), 74% of the respondents reported that they would be using wood next year. Fifty-seven percent of the medium stratum (combined) and 35% of the combined low

TABLE 10. Type of alternative heat source in wood burning survey households that have alternative sources

Region	Unit	Oil furnace	Oil heater	Oil cook stove	Electric heat	Catalytic heater
Eastern	1	40%	2%	2%	51%	4%
	2	34	5	5	54	2
	3	40	0	9	44	7
Central	5	47	2	7	43	1
	7	17	7	12	54	5
	8	41	4	3	50	1
	9	68	1	0	32	0
	10-12	41	0	2	54	2
Western	14	51	1	3	40	3
	15	43	2	4	46	4
	16	46	0	2	48	4
	17	41	6	12	41	0
	18	90	0	5	2	2

Note: Percentage totals may not always be equal to 100 because an "other" category was included and sometimes checked, but not included in this table.

strata households indicated they would be using wood. It would appear likely that the majority of households which presently obtain all or a substantial portion of their heat from wood will continue to use wood, and that a small number of present non-burners will begin to use wood next year.

Comments appended to returned mail questionnaires or made to the telephone interviewers suggest why some respondents plan to begin using wood, and why others intend to discontinue using it. For the most part, those planning to begin using wood cite the high cost of heating with oil or electricity as a major reason. Respondents intending to discontinue the use of wood gave two main reasons for doing so; the work and inconvenience of obtaining and using wood (particularly for older people), and the more reasonable cost of heating with oil and electricity at present, particularly with the installation of adequate insulation.

The future intentions of householders, on a unit and stratum basis, are shown in Table 11. Management units with larger population centres (eg. Units 1, 10-12, 14) have the smallest percentage of respondents planning to burn wood next year. On a regional basis, the Central and Western Regions have a higher percentage of committed wood uses for next year than does the Eastern Region.

TABLE 11. Percentage of respondents planning to burn wood in the coming year

Region	Unit	Stratum	By stratum	By unit overall
Eastern	1	H	61%	
		M	49	
		L	25	43%
	2	H	87	
		M	77	
		L	57	72
	3	H	72	
		M	48	
		L	46	51
Central	5	H	81	
		M	55	
		L	40	66
	7	H	74	
		M	72	
		L	62	72
	8	H	92	
		M	68	83
	9	H	85	
		M	78	84
	10-12	H	100	
		M	57	
		L	43	48
Western	14	H	74	
		M	41	
		L	37	50
	15	H	100	
		M	73	
		L	44	51
	16	H	70	
		M	78	74
	17	M	89	
		L	85	87
	18	H	77	
		M	47	69
Gros Morne			78	78

3.1.9 Artificial Logs

The use of artificial logs was of interest to this study because these logs represent an alternative source of fuel for fireplace users. Use of these logs is primarily for aesthetic or recreational purposes rather than for heating. Only 4% of all of the respondents burned artificial logs at their residence. On a Regional basis, the percentage of households burning the logs is:

Eastern Region	5%
Central Region	1%
Western Region	2%

Among the respondents who burned artificial logs at their residence, the average number used was 14 per year. The average burned per year for households in the three strata was:

Low Stratum	15
High Stratum	12
Medium Stratum	11

Two percent of the 538 cabin owner respondents used artificial logs at their cabin. The average number of logs burned during the past year (1983) was 22.

3.2 Acquisition of Fuelwood

3.2.1 Method of Acquisition

Approximately 71% of the respondents obtain wood by cutting it themselves, and 15% buy it (either roundwood or scrapwood). Table 12 shows the method of acquisition by management unit.

On a Regional basis, the Central Region has the lowest percentage of households cutting the wood supply; the Western Region has the highest.

Most respondents completing the "buy some-cut some" category failed to indicate the percentage cut and percentage bought as requested. Usually it was a case of just not knowing. Consequently, we had to include this category in the report rather than assigning the appropriate percentage to the "cut" or "bought" category as was intended. Thus an explanation of the column headings of Table 12 is required.

Cuts own	- cuts the entire household requirement
Buys roundwood	- this household obtains its entire wood supply by buying roundwood
Buys scrapwood	- uses scrapwood only, and buys it all
Cuts some-buys some	- households in this category both cut and buy
Other	- usually given by family member or friend

TABLE 12. Method of fuelwood acquisition by survey households

Region	Unit	Percentage of households				
		Cuts own	Buys roundwood	Buys scrapwood	Buys some, cut some	Other
Eastern	1	63%	20%	1%	13%	3%
	2	69	10	1	17	3
	3	75	12	0	10	3
Central	5	69	18	1	11	1
	7	82	3	0	15	0
	8	73	14	1	11	1
	9	86	7	1	5	1
	10-12	55	23	1	21	0
Western	14	79	13	1	6	1
	15	70	11	2	16	1
	16	80	9	0	8	3
	17	93	5	0	0	2
	18	88	7	1	3	1
Gros Morne		87	6	0	6	1

3.2.2 Source of Wood Cut by Householder

Respondents were asked to indicate if they cut fuelwood from Crown Land, private land, or paper company limits. In some instances, a respondent would list more than one location, often saying how much or what type (hardwood, etc.) was harvested from each location. With these clues it was frequently possible to establish which location was the site of the major harvest. This was then used in the analysis. Where no clues were available to select one location from the multiple answer we chose Crown land.

Seventy-eight percent of the wood burning respondents cut wood on Crown Land, 13% on private land, and 9% on paper company limits. Table 13 shows the location information on a unit basis.

Of the 538 cabin owners reporting cabins, 459 provided answers to this question. Sixty-two percent of these cabin owners harvested wood from Crown Land, 29% from private land, and 9% from paper company limits. On a Regional basis, harvest locations were:

	Crown	Private	Paper Co.
Eastern	63%	36%	1%
Central	66	19	15
Western	57	34	9

TABLE 13. Location from which survey households harvest wood for residential use

Region	Unit	Crown	Private	Paper Co.
Eastern	1	74%	25%	1%
	2	90	10	0
	3	98	2	0
Central	5	89	4	7
	7	95	4	1
	8	89	6	5
	9	86	1	13
	10-12	26	4	70
Western	14	61	27	12
	15	57	14	29
	16	51	12	37
	17	84	0	16
	18	97	2	1
Gros Morne*		90	10	0

*Gros Morne National Park

3.2.3 Distance Travelled to Cut Wood

Householders were asked to respond to this question in "miles" rather than "kilometres" since we felt that the mile was still a more familiar term than kilometre throughout the island. In some cases, respondents checked more than one distance category. Where this occurred, we used the greater distance for analysis purposes.

Fifty percent of surveyed households travelled up to 8 km (5 miles) to cut fuelwood. Distances up to 40 km (25 miles) were travelled by 41% of reporting households, with 8% going more than 40 km.

Over half (56%) of the survey householders in high strata obtained fuelwood within 8 km (5 miles) of their home. This compares with 49% of householders in the medium strata and 36% in the low. In the "5-10 mile" distance, all strata were equally represented (23%). Beyond 16 km (10 miles) high strata householders fell to third position behind medium and low strata households.

Distances travelled by survey households in each unit are shown in Table 14. The "1-5 mile" (1.6-8 km) distance is clearly the single distance category that the highest percentage

TABLE 14. Distance (in miles) that surveyed households travelled to cut wood, by unit

Region	Unit	1	1-5	5-10	10-25	25	Off* Avalon
Eastern	1	17%	41%	21%	14%	6%	1%
	2	13	40	21	20	6	
	3	5	44	35	12	4	
Central	5	4	40	33	16	7	
	7	14	27	36	16	7	
	8	11	44	23	16	6	
	9	6	48	27	16	3	
	10-12	3	24	40	23	10	
Western	14	12	43	11	15	17	
	15	14	30	17	21	18	
	16	10	43	22	18	7	
	17	6	26	21	28	19	
	18	2	27	24	38	9	
	GM	6	47	10	25	12	

*For Unit 1 residents only

of households travel to cut fuelwood. In the western region there is a noticeable increase in the percentage of householders travelling the "10-25 mile" and "more than 25 mile" distances.

An interesting observation is the 17% of householders in Management Unit 1 travelling less than 1 mile to cut fuelwood. This unit, essentially the Avalon Peninsula, has the greatest demand of any unit for fuelwood, and yet has only a limited forest base to meet this demand.

3.2.4 Methods of Wood Transport

The majority of respondents transport fuelwood in more than one way; perhaps forwarding it to roadside by snowmachine and then transporting it home by truck. Consequently, most answers to this question were multiple answers. The frequency with which transport methods were given (all units and all strata combined) were:

Truck	54%	of households
Snowmobile	28%	" "
Horse	5%	" "
Car	4%	" "
Boat	3%	" "
Other	7%	" "

3.2.5 Time of Fuelwood Acquisition

On an island-wide basis, the survey shows that 79% of all fuelwood is obtained during the fall and winter--from October to March. Table 15 shows the percentages obtained in each month.

TABLE 15. Months when fuelwood is obtained by wood burning households

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
15%	13%	11%	5%	3%	2%	2%	2%	7%	13%	15%	12%

3.2.6 Price of Fuelwood

On an island-wide basis, the mean prices paid for various types of wood are:

	Per pick-up load	Per cord	Per solid m^3
Hardwood	$42.32	$67.31	$27.96
Softwood	36.08	52.02	21.61
Scrapwood	11.47	27.22	11.31

Table 16 shows the mean prices paid by surveyed households for each type of wood in each management unit. Fifty-two percent of householders purchasing fuelwood stated that prices were higher than in the previous year; forty-two percent reported prices unchanged.

Seventy-nine percent of the households surveyed indicated that wood purchased by them was delivered.

TABLE 16. Mean price paid by survey households for fuelwood

Unit		Mean price ($) Hardwood Pick-up	Hardwood Cord	Softwood Pick-up	Softwood Cord	Scrapwood Pick-up	Scrapwood Cord*
Eastern	1	50.03	91.27	39.49	55.11	10.68	
	2	46.50	77.50	35.23	75.00	12.82	
	3	58.89	73.33	45.00	57.50	20.00	
Central	5	42.50	57.75	37.00	53.50	10.22	
	7	35.00	70.00	36.66	40.00	14.17	
	8	37.00	48.00	31.00	43.00	10.33	
	9	26.00	46.30	26.67	37.14	11.67	
	10-12	31.19	50.05	26.72	46.67	25.00	
Western	14	43.53	55.00	34.17	55.00	10.83	
	15	51.47	62.50	37.86	43.95	7.50	
	16	31.00	50.00	26.67	48.50	15.00	
	17	25.00	50.00	35.00	-	-	
	18	-	-	40.00	63.33	20.00	
Gros Morne		41.00	60.00	30.00	42.50	10.00	

*Too little scrapwood purchased by the cord for figures to be used.

3.2.7 Total Amount Spent for Fuelwood

On an all unit-all strata basis, $207.75 was the mean amount spent by survey households to purchase fuelwocd in 1983. Expenditures ranged from a minimum of $4.00 to a maximum of $1,050.00. The mean for all high strata households combined was $244.43, for all medium strata $203.77, and $172.27 for all low strata households.

The amount spent to purchase fuelwood is shown, on a unit basis, in Table 17.

In 1983, the estimated total island expenditure for fuelwood (for residential use) was $2,039,690. This figure was derived by extrapolating cost data, provided by the 15% of wood burning respondents who purchased fuelwood, to the estimated number of wood burning households on the island.

TABLE 17. Amount spent per household for fuelwood, by unit

Region	Unit	Mean	Minimum	Maximum
Eastern	1	$169.72	$ 8.00	$ 945.00
	2	128.64	5.00	600.00
	3	232.97	25.00	720.00
Central	5	250.38	15.00	1,000.00
	7	123.53	12.00	365.00
	8	277.95	20.00	1,000.00
	9	300.21	40.00	800.00
	10-12	248.72	25.00	690.00
Western	14	293.86	35.00	1,050.00
	15	164.15	4.00	600.00
	16	242.33	30.00	700.00
	17	285.00	70.00	500.00
	18	319.00	150.00	560.00
	GM	205.83	110.00	290.00

4. PHASE 2: UNIT FORESTER INTERVIEWS

Information on fuelwood supply and demand, and on problems associated with the harvest of fuelwood, was received from 11 of the forest management units on the island. Bowater Newfoundland Ltd., and Gros Morne National Park also provided information on fuelwood harvesting on lands which they control.

4.1 Domestic Cutting Permits

The total number of domestic cutting permits issued in 10 units since 1975/76 is shown in Table 18. From 1975/76 (the first year for which all reporting units maintained records) to 1982/83, the total number of permits issued increased from 5,304 to 27,534, an increase of 419%. This reflects the determination by householders to reduce their dependence on oil and electric heat, both of which began to rise dramatically in price about 1972/73 (Northland Associates Ltd., 1980).

The year-to-year rate of increase in the total number of domestic cutting permits issued in the 10 units has levelled off. There were 31% more permits issued in 1977/78 than in 1976/77, but only 17% more in 1982/83 than 1981/82. This levelling off likely also reflects a levelling off in the prices of heating oil and electricity, both of which have shown less dramatic year-to-year increases since the early

Domestic cutting permits (Crown Lands) issued by unit, 1975/76 - 1982/83

Unit	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	No. of designated cutting areas	Type of areas designated for domestic cutting
1	1,199	1,457	1,580	2,579	4,446	7,344	9,419	11,397	150	Poor quality, insect damage, post commercial harvest.
2	707	960	957	1,580	2,060	2,535	2,786	3,025	27	Dead stands, high-graded stands
3										
5	950	1,137	1,556	1,730	1,930	2,366	2,543	2,606	33	Fire damaged, good timber sometimes.
7	135	155	358	322	518	628	749	1,006	None	Hardwood stands in cutovers.
8	1,402	1,477	1,932	1,732	2,378	2,570	2,580	3,620	48	No information.
9										
10-12				Paper Company Limits					None	
14		167	393	408	785	1,192	1,591	1,424	None	No areas designated.
15		219	270	307	392	603	739	1,056	6	Birch and spruce stands.
16	11	214	85	120	131	184	207	213	8	Birch stands, softwood stands.
17		2	40	148	246	339	796	947	9	Overmature sites, poor sites.
18	900	1,000	1,300	1,704	1,921	2,022	2,128	2,240	18	Low volume, poor softwood sites
Gros Morne										
TOTALS	5,304	6,598	8,471	10,630	14,807	19,783	23,538	27,534		

1980s. Also, by 1981 and 1982 the majority of households contemplating a move to wood heat had probably done so.

Bowater Newfoundland Ltd. issues domestic cutting permits on company limits for hardwood only. These permits are issued without charge at all company road gates, district offices and at head office. Fuelwood cutters are allowed on company limits on weekends only, when road and forest fire conditions permit safe access to the forest. A small fee is charged for each vehicle going through the gates.

Parks Canada permits the domestic harvest of fuelwood in certain areas of Gros Morne National Park. Analysis of the timber returns indicates that 400 to 500 households in park communities obtain permits annually.

4.2 Designated Cutting Areas

Most of the forest management units on the island have designated domestic cutting areas (Table 18). These areas generally contain poor quality, insect-damaged, fire-damaged or highgraded stands.

4.3 Problems Caused by Fuelwood Cutting

Unit personnel were asked to comment on regeneration or degradation problems (if any) that were the direct result of

domestic fuelwood cutting practices. Highgrading was the most frequently mentioned concern.

A synopsis of the comments received from the 11 units providing information is presented on the next page.

Unit	Comments
1	No major problems in site deterioration. Biggest problem is that domestic cutters do not have the means to forward wood from the stump to roadside. Most wood is hand-carried. This results in access roads and cutting areas being face cut (ie. cut near the edge).
2	Difficult to manage and supervise the large number of cutters in a large geographical area.
5	Highgrading is frequently a problem.
7	Highgrading.
8	Highgrading.
10-12	Paper company limits: thus not applicable.
14	No major problems.
15	Highgrading, illegal cutting, and cutting close to road-right-of-way.
16	Not many problems.
17	Degradation of the forest because of widespread random cutting, and by cutting timber which is well suited to sawlogs and/or pulp.
18	Highgrading (perhaps more a result of sawlog cutting), cutting outside designated areas, cutting sawlogs.

4.4 Use of Sawmill Residue

The information obtained from forestry personnel indicates that in most of the management units, much of the available sawmill slab residue is used for fuelwood. This residue is usually sold, but occasionally it may be free for the taking. A synopsis of the comments from 11 units is presented on the next page.

Table 19 shows the number of sawmills operating in 11 units in 1981/82 or 1982/83 (the most recent year, either 81/82 or 82/83, for which production data were available are used in this survey). Mill production, and the slab residue resulting from that production are also shown in the table. The method of converting f.b.m. of production to tonnes of slab residue follows the method outlined by Buggie (1983).

A review of Table 19 indicates that the units with greater production are in the eastern and northeastern portions of the island, but good residue volumes are produced in most units. How much of this slab residue is accessible to, and used by, householders for fuel is not known. Accessibility varies from unit to unit. It was not within the scope of this study to rate the accessibility level of each individual sawmill. However, this would be a useful exercise for the future, particularly in those units where the demand for fuelwood continues to increase and where the supply of standing timber (for fuelwood) is limited.

Unit	Comments
1	All residue from sawmills located near communities is being utilized for fuelwood.
2	Most mills are isolated, far from communities. Little residue is sold for fuelwood.
5	Accessible mills dispose of all of their residue for fuelwood.
7	Most mills sell residue for fuelwood.
8	Most mills sell or give away the residue for fuelwood.
10-12	Most residue is used for firewood.
14	When accessible, residue is used for fuelwood.
15	All accessible sawmills have no problem in disposing of their residue as fuelwood.
16	Most sawmills dispose of residue as fuelwood.
17	High utilization of residue.
18	Low utilization of residue.

TABLE 19. Number of sawmills and sawmill production (11 units)

Unit	No. of mills*	Production solid m^3**	Green tonnes of slabs***	Oven dried tonnes of slabs***
1	208	9,634	5,512	3,307
2	353	14,041	8,033	4,820
5	80	8,463	4,842	2,950
7	19	2,387	1,365	819
8	145	10,963	6,272	3,763
10-12	18	3,194	1,827	1,096
14	147	4,532	2,593	1,556
15	104	6,210	3,553	2,132
16	65	4,325	2,474	1,485
17	85	1,627	931	559
18	111	6,197	3,545	2,127

*Operating during 1981/82 or 1982/83

**Total production (softwood, hardwood, Crown Land, private land)

***Conversion from f.b.m. to tonnes is based on factors given in Buggie, 1983.

4.5 Fuelwood Supply and Demand

While the demand for fuelwood is still high in most units, there are indications (eg., number of domestic cutting permits issued) that the demand is levelling off or expected to level off in a few years. In Management Unit 1 there was a decrease in the number of permits issued in 1983/84 over the previous year. And in Unit 14, there were fewer permits issued in 1982/83 than in 1981/82.

There is some concern that the diminishing forest land base in Unit 1, combined with an excessive demand for timber, may result in a fuelwood supply shortfall in this unit. In most of the other units there appears to be an ample supply to meet the demand, at least in the next 5-10 years. However, it was frequently stressed that more intensive management of the fuelwood resource should be implemented to ensure the supply. It was also suggested that developing a strategy to make the presently inaccessible sawmill slab residue available to the consumer would further increase the supply.

The role of the commercial fuelwood retailer may become more important in time. If management dictates that some restrictions be placed on cutting by the householders, there appears to be a sufficient number of retailers ready to step in to meet the demand.

A synopsis of the comments from the ten units responding to this question is presented on the next page.

Unit	Comments
1	There has been a decrease in the number of permits issued in 1983/84 over 1982/83. The unit forester predicts that this decrease will continue. Supply could be a problem.
2	Demand for fuelwood will continue to grow but at a slower pace in the future. No supply problems are anticipated if sound management strategies are in place.
7	Demand will continue to grow slowly. Supply should not be a problem, particularly if increased attention is placed on management of fuelwood harvesting.
8	Demand for fuelwood should peak in next few years; at that time the estimated annual cut for fuelwood will be somewhat in excess of 35,000 cords. Supply should not be a problem.
10-12	Demand remains high. Supply (timber company limits) is not a problem.
14	Expects the demand to increase in coming years. Supply should not be a problem, particularly if the use of residue is promoted.
15	Demand will increase for some time yet. No supply problems anticipated.
16	No shortage of supply. Demand may be levelling off.
17	In most sections of unit, there is an ample supply. Demand still increasing.
18	Demand is very high; supply is available.

5. PHASE 3: FUELWOOD RETAILER INFORMATION

5.1 Fuelwood Retailers

Information provided by unit forestry personnel indicated that there were between 80 and 100 licenced commercial fuelwood retailers active on the island of Newfoundland in 1983. Unit personnel identified 79 retailers, but since two units did not provide information, the number of licenced retailers is likely to be close to 100.

The number of individuals cutting and retailing fuelwood without a licence varies from unit to unt. In some units it was the feeling of forestry personnel that unlicenced dealers handle two or three times more fuelwood than the licenced retailers. This illegal trade appeared to be more prevalent in the Central and perhaps Western Regions than in the Eastern Region.

Twenty-two of the seventy-nine fuelwood retailers contacted provided information on their operation for this survey. This information is contained in Tables 20 and 21 . Because of the small number, and the age and varying sizes of operations, the volume-related data should be treated with caution. For this reason we combined the information and presented it by Forest Management Region.

TABLE 20. Fuelwood retailers: nature of the operation

Region	# retailer operators	# supplying information	Years in business				Cutting Areas			Source of Wood					Type of operation			Heavy equipment		Distance travelled (miles)						Cutting seasons			
			1	2-5	6-10	10+	Crown	Private	Paper co.	H.W. stands*	H.W. from cutover	S.W. stands	Burned areas	Budworm areas	F.W. only*	F.W./S.L.	F.W./S.L./P.W.	Yes	No	< 1	1-5	5-10	10-25	> 25	Off Avalon	Spring	Summer	Fall	Winter
Eastern	31	7	2	4	1		7	1		1	2	5		2	6		1	4	3		2	2	2	1		4	3	4	7
Central	40	10	2	3	4	1	7		4	5	3	1	3	3	6	1	3	8	2	1	2	3	4			1	2	8	10
Western	8	5	2	2	1		4	1	1	1	1	2				3	2	5		1			3	1		3	3	5	3
TOTALS	79	22	6	9	6	1	18	2	5	7	6	8	3	5	12	4	6	17	5	2	4	5	9	2		8	8	17	20

*H.W. = Hardwood S.W. = Softwood
F.W. = Fuelwood S.L. = Sawlogs
P.W. = Pulpwood

TABLE 21. Fuelwood retailers: sales information

Region	# operators	# supplying information	Av. total 1982-83 sales (m^3)* H.W.	S.W.	Av. ann. sales (m^3) 1978-1983 H.W.	S.W.	Average 1982-83 prices ($/$m^3$) H.W.	S.W.	Type of sale: Junks	4-8' lengths	Tree lengths	Season of major sales: Spring	Summer	Fall	Winter	Area of sales: Avalon Penin.	Central Nfld.	Western Nfld.	Northeastern Newfoundland	Northern Penin.	Burin Penin.	South Coast	Projected sales**: More	Less	Same
Eastern	31	7	264	1343	256	882	15	13	3	3	2	3		4	6	7							3	2	2
Central	40	10	558	896	500	648	14	12	5	5	2	1		3	4		9		1			1	4	2	4
Western	8	5	320	666	225	450	16	11	3	2		1	1	4	1			2		4			2	1	2
TOTALS	79	22							11	10	4	5	1	11	11	7	9	2	1	4		1	9	5	8

*H.W. - Hardwood
S.W. - Softwood

**Compared with 1982-83

5.2 Annual Sales

Average annual sales for 1983 and for the period 1978-83 are shown by region in Table 21. The largest retail operation (marketing on the Avalon Peninsula) had a sales volume of 5,976 solid m^3 of softwood in 1983. By contrast, the smallest sales volume (also softwood on the Avalon Peninsula) was 10 solid m^3. Softwood accounted for 72% of sales in 1983, an increase from 67% of sales that softwood averaged in the five years prior to 1983.

5.3 Type of Operation

Over half (55%) of the retailer respondents operate a fuelwood business only; the remainder sell fuelwood as part of a combined fuelwood-sawlog, or fuelwood-sawlog-pulpwood operation.

5.4 Wood Supply

Seventy-two percent of the retailers harvest wood from Crown Land, 20% from paper company limits, and 8% from private land.

The softwood stand was the forest type most frequently harvested by the retailer respondents (28%), followed by hardwood stands (24%), cutover hardwood (21%) (hardwood remaining after pulpwood harvest), budworm-damaged timber (17%), and fire-damaged timber (10%).

5.5 Future Sales

Forty-one percent of the retailer respondents expect to increase their sales volume next year, 23% are anticipating a decrease in sales, and 36% are projecting a sales volume similar to that for 1983.

6. PHASE 4: AN EVALUATION OF THE DRAIN ON THE FOREST RESOURCES OF THE AVALON PENINSULA RESULTING FROM DOMESTIC FUELWOOD CUTTING

The original objective of Phase 4 of this study was to evaluate the degradation that domestic fuelwood harvesting may be causing to designated cutting sites of the Avalon Peninsula. However, it soon became apparent that a long-term program of field measurements at the designated sites would be required to fully meet this objective. Consequently, in consultation with the Scientific Authority, Phase 4 was redesigned; the new objective was to evaluate the drain that domestic fuelwood cutting had on the forest resource at designated fuelwood cutting sites on the Avalon Peninsula between 1979 and 1983.

Coloured aerial photography taken in 1979 and 1983 was interpreted, and volume estimates determined using standard forest inventory techniques.

The original (1979) condition of the forest stands in the fuelwood cutting blocks was determined. An atlas was prepared to show this information. Similarly, an evaluation was made of the 1983 condition of the cutting blocks that had been disturbed by domestic cutting. Timber volumes were compiled for the disturbed stands, and tables showing the drain between 1979 and 1983 were prepared.

Phase 4 results are presented in a separately bound report and atlas.

7. DISCUSSION

7.1 Attitudes of Respondents

Generally speaking, respondents' attitudes toward the survey were positive. The 43% response to the mail questionnaire is considered to be good, and even exceeds the 40% return which most mail surveys traditionally bring (Statistics Canada, personal communication).

For the most part, the telephone respondents were also co-operative, with the small number of refusals primarily from the larger population centres. Rural respondents appeared most interested in the survey and willingly provided information.

The general interest in the survey is reflected in the large request rate (approximately 98%) for the information summary when the study is complete.

7.2 Fuelwood Consumption

It is estimated that there were 65,451 wood burning households on the island of Newfoundland in 1983. This represents 46% of island households, and includes all households that burn wood regardless of the amount. It is difficult to compare this figure with the 32,358 "serious" wood burning households (burning more than 0.2 solid m^3) recorded in the 1978 survey

(Northland Associates Ltd., 1980). Also, the Avalon Peninsula was not adequately sampled in the 1978 survey. However, the large increase from the 32,358 "serious" burners in 1978 to the 65,451 wood burners in 1983 clearly indicates that there has been a substantial increase in the number of wood burning households on the island in the last 5-6 years.

On an island-wide basis, wood burning respondents consumed an average of 12.9 m^3 of wood at residences and 3.0 solid m^3 at cabins in 1983. This figure of 12.9 solid m^3 for residences represents a 36% increase in average household consumption from the 9.5 solid m^3 reported in the 1978 fuelwood survey (Northland Associates Ltd., 1980).

The estimated total island-wide consumption by all wood burning households in 1983 was 820,004 solid m^3, a 168% increase over the estimated 306,483 solid m^3 consumed on the island by "serious" wood burners in 1978. This increase is not unexpected since the 1978 study concluded that on the island of Newfoundland, ". . . fuelwood consumption is expected to increase considerably in the foreseeable future. . . ."

Softwood accounted for 77% of the roundwood consumed on the island in 1983. This is higher than the 69% softwood burned in 1978. Softwood is more abundant and available than hardwood

in most areas of the island. In 1983, only Management Units 10-12 and 15 (central and western Newfoundland) showed a greater use of hardwood than softwood. Hardwood is probably preferred by the majority of wood burners. However, hardwood's declining availability and greater price likely will mean that softwood will continue to be used more and more in the future.

7.3 Fuelwood Procurement

Approximately 600,000 solid m^3 (77%) of the fuelwood consumed on the island in 1983 was cut by the householder, and 78% of this amount was from Crown Land (13% was from private land and 9% from paper company limits). Approximately 80% of all the householders that cut fuelwood did so within 40 km (25 miles) of the residence, with 50% of this number obtaining their requirement within 8 km (5 miles) of the residence. The majority of fuelwood retailers also obtain their wood supply from Crown Land less than 40 km from the communities in which they live.

Clearly, fuelwood harvesting places the greatest pressure on that portion of the forest resource occupying Crown Land adjacent to communities. The greatest demand is within 8 km (5 miles), with the demand decreasing with distance from the communities. If not accommodated by a management plan, this pressure is likely to continue until the resource is depleted. The fuelwood management plans presently being developed for

some units should be considered for all inhabited units. An annual allowable fuelwood cut should be established for the various distance belts (1-5 miles, 5-10 miles etc.) from any community where the demand for fuelwood is high.

In time, the householder may not be able to conveniently and inexpensively obtain his fuelwood requirement. One option would be to purchase fuelwood from a retailer. Fuelwood retailers supplied from 5-10% of the fuelwood consumed in 1983 (the precise figure is not known because of the "cut some-buy some" category of wood procurement). However, this study shows that retailers are prepared to meet the demands of an expanding market. It is conceivable that the future will see the development of a wholesale and retail network to supply fuelwood to those homeowners choosing to purchase it.

The remaining 10-15% of the fuelwood consumed on the island of Newfoundland in 1983 consisted of scrapwood(purchased or free for the taking), gifts of roundwood, and the wood reported in the "buy some-cut some" category.

7.4 Drain on Annual Allowable Cut

The total volume estimates reported from this survey cannot be considered the actual drain by fuelwood harvesting on the productive forest stands in 1983. Much of the wood consumed

would have been harvested from scrub forest, logging residues, burned areas, etc. Also, scrapwood constituted a portion of the estimated volumes. The annual allowable cut estimates are made for productive areas only and do not include scrub forests containing less than 28 solid m^3 per ha. The volume estimates in this report thus likely overestimate the drain on productive forest areas.

The most recent annual allowable cut figures available for the entire island date from 1979, and these are for softwood only. Updated figures have been proposed for some management units, but because of incomplete information relating to the derivation of these figures, we hesitate to publish them here. For example, annual allowable cuts have been proposed for paper company limits by the companies; but these figures are for operational purposes, and are subject to review and revision by Department of Forest Resources and Lands' officials. The basis on which the data are derived is not always clear. Similarly, the annual allowable cuts proposed by forestry personnel in the management units sometimes require clarification. For example, the types of land which are alienated (and thus not included in the AAC figures) differ from unit to unit. Also, the method of presenting the AAC data varies from unit to unit; some combine the hardwood and softwood figures, others present the figures separately.

Consequently, we consider the 1979 figures for softwood (Dept. of Forest Resources and Lands, 1981) to be the most recent available (and published) annual allowable cut data. These data, presented in Table 22, should be used with caution. We feel it would be misleading to compare, either in total or on a unit-by-unit basis, the annual allowable cut data for 1979 with the estimated fuelwood consumption for 1983.

Data are avilable for a comparison of the softwood volumes cut for fuel with the softwood harvested for other purposes (pulp and paper mills, sawmills). The rounded figures (to the nearest 1,000 solid m^3) for 1982-83 are:

	Softwood harvest	% of total
Pulp/paper	1,774,000	70
Fuelwood	597,000	24
Sawlogs	145,000	6
	2,516,000	100

Explanations are required for these figures:

Pulp and paper - These figures (Forest Products Division, Department of Forest Resources and Lands - personal communication) represent the maximum annual requirement for the three paper mills on the island. The actual figure may be less, depending on market conditions.

TABLE 22. Annual allowable cut (softwood), island of Newfoundland, 1979

Unit	1979 AAC (softwood) (solid m^3)
1	71,000*
2	108,000
3	52,000
4	86,000
5	206,000
6	251,000
7	151,000
8	114,000
9	404,000
10-12	445,000
13	63,000
14	480,000
15	398,000
16	297,000
17	207,000
18	379,000
	3,714,000

*Rounded to nearest thousand

Sawlogs - Information was provided to this study by 11 management units. Actual production would be somewhat higher if data for all units were available.

Fuelwood - These figures (based on the present survey) are likely an overestimate of fuelwood harvests from productive forest stands since some softwood is cut from scrub areas.

Acknowledging that these figures are approximate (given the above explanations), it would appar that softwood harvesting for fuel accounts for about one quarter of the possible volume of softwood harvested annually from the island's forest lands.

7.5 Wood Burning Equipment

In 1983, the single most common type of wood burning equipment used by households was the wood burning stove; 64% of the households used stoves only. Nine percent of the households burned wood in a fireplace in 1983. As discussed in Section 3.1.6, this appears to be a drop in fireplace use since 1978 (Northland Associates Ltd., 1980).

The percentage of households with wood or wood/oil furnaces in 1983 was 18-20%. This substantial increase from the 1978 situation, when 3-5% of the households were using wood or wood/oil furnaces, indicates that homeowners have made a real

commitment to replace oil and electricity with wood heat. Such a financial investment is unlikely to be abandoned quickly.

Further evidence that homeowners are committed to wood fuel is shown by the increase in the percentage of wood burning households with no other source of heat in 1983 compared to the 1978 figures. In 1978, 5% of the households heated with wood only (Northland Associates Ltd., 1980); in 1983, this figure has increased to 24% of the households. Many of these are new homes with wood burning furnaces or larger wood burning space heaters.

7.6 Projections

While the number of wood burning households and the estimated amount of fuelwood consumed on the island in 1983 were both substantially higher than in 1977/78, the demand for fuelwood appears to be levelling off in many areas. In some areas, particularly near larger population centres, there is concern that the forest resource may be damaged by fuelwood cutting activities. However, in general overview, the resource appears to be capable of supplying the demand for fuelwood, particularly if fuelwood management plans are adopted.

8. LITERATURE CITED

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APPENDIX 1

LIST OF COMMUNITIES ON THE ISLAND OF NEWFOUNDLAND SHOWING STRATIFICATION USED IN THIS SURVEY

UNIT 1

Low Stratum

Mount Pearl	I*	3,245**	St. John's	I	24,525
Wedgewood Park	I	310			
			TOTAL		28,080

Medium Stratum

Carbonear	I	1,395	Paradise	I	775
Conception Bay South	I	2,830	Petty Harbour/Maddox Cove	I	205
Flatrock (near Torbay)	I	205	Portugal Cove	I	545
Foxtrap/Greelytown/			Pouch Cove	I	400
Peachtown/Kelligrews	U	636	Seal Cove	U	138
Goulds	I	1,035	St. John's Metro Area	I	6,470
Harbour Grace	I	845	St. Phillips	I	400
Hogans Pond	I	35	St. Thomas	I	110
Holyrood	I	430	Torbay	I	850
Indian Pond	U	36			
Lawrence Pond	I	10	TOTAL		17,350

High Stratum

Admirals Beach	I	75	Broad Cove (near		
Admiral's Cove	U	28	Salmon Cove)	U	39
Angels Cove	U	13	Brownsdale	U	55
Aquaforte	I	60	Bryant's Cove	I	95
Argentia	U	26	Burnt Cove	U	48
Arnold's Cove	I	305	Burnt Point	U	72
Arnold's Cove Station	U	9	Butlerville	U	101
Avondale	I	230	Calvert	U	134
Bareneed	U	75	Cape Broyle	U	194
Bay de Verde	I	220	Caplin Cove	U	42
Bay Roberts	I	1,280	Carbonear Suburbs	U	28
Bellevue	U	79	Cavendish	U	95
Bellevue Beach	U	14	Chance Cove	I	115
Birch Hills	U	21	Chapel Arm	I	160
Biscay Bay	I	20	Chapel Cove	U	82
Bishop's Cove	I	95	Clarke's Beach	I	275
Blaketown	U	171	Colinet	I	75
Blow Me Down	U	43	Colliers	I	190
Branch	I	120	Conception Harbour	I	235
Brigus	I	235	Crockers Cove	U	16
Brigus Junction	U	22	Cupids	I	190
Brigus South	U	31	Cupids Crossing	U	26
Bristol's Hope	U	36	Cuslett	U	24
Broad Cove (near			Dildo	U	244
Greens Harbour)	U	55			

* I = Incorporated communities
U = Unincorporated communities

** Number of households

UNIT 1

High Stratum (Cont.)

Dildo South	U	81	Markland	U	96
Dunville	I	475	Marysvale	U	194
Fair Haven	U	50	Mizzen Cove	U	7
Fermeuse	I	135	Mobile	U	48
Ferryland	I	190	Mount Carmel/Mitchell's Brook/St. Catherine's	I	194
Flatrock (near Salmon Cove)	U	28	New Bridge	U	17
Forest Field	U	10	New Chelsea	U	40
Fox Harbour	I	135	New Harbour	U	216
Freshwater (Bell Island)	U	38	New Melbourne	U	34
Freshwater (Carbonear)	U	58	New Perlican	I	110
Freshwater (Placentia)	I	295	Norman's Cove/Long Cove	I	320
Gaskiers/Point La Haye	I	105	Northern Bay	U	60
Georgetown	U	87	North Harbour (St. Mary's Bay)	U	42
Goulds Road	U	33	North River	I	60
Grates Cove	U	76	Ochre Pit Cove	U	43
Great Barasway	U	6	O'Donnells	U	78
Green's Harbour	U	218	Old Perlican		
Gullies	U	32	Old Shop	U	70
Gull Island	U	101	Path End	U	25
Halls Town	U	91	Patrick's Cove	U	43
Hant's Harbour	I	160	Perry's Cove	U	39
Harbour Grace South	I	95	Placentia	I	570
Harbour Main/ Chapel Cove/Lakeview	I	310	Point Lance	I	25
Harricott	U	8	Point Verde	U	82
Heart's Content	I	175	Port de Grave	U	74
Heart's Delight/ Islington	I	245	Portugal Cove South	I	75
Heart's Desire	I	90	Port Kirwin	I	50
Hibbs Cove	U	47	Red Head Cove	U	63
Hopeall	U	68	Renews/Cappahayden	I	165
Jerseyside	I	150	Riverhead (Conception Bay)	U	100
Job's Cove	U	56	Riverhead (St. Mary's Bay)	I	95
Juniper Stump	U	47	Roaches Line	U	41
Kingston	U	36	Salmon Cove	I	210
La Manche	U	4	Shearstown	U	74
Lance Cove	U	57	Ship Cove (Placentia Bay)	U	7
Lead Cove	U	26	Ship Cove (Conception Bay)	U	69
Little Harbour	U	60	Ship Harbour	U	74
Long Beach	U	22	Shore's Cove	U	14
Long Harbour/Mount Arlington Heights	I	150	Sibley's Cove	U	53
Lower Island Cove	U	115	Small Point/Broad Cove/ Blackhead/Adams Cove	I	170
Low Point	U	11	Smooth Cove	U	13
Mall Bay	U	20	Southern Harbour	I	165
Makinsons	U	88	South River	I	195
			Spaniard's Bay	I	555

UNIT 1

High Stratum (Cont.)

St. Bride's	I	145	Tors Cove	U	99
St. Michaels	U	13	Trepassey	I	350
St. Joseph's	I	75	Turks Cove	U	17
St. Mary's	I	170	Upper Island Cove	I	505
St. Shott's	I	50	Victoria	I	470
St. Vincent's/			Wabana	I	1,070
St. Stephens/			Western Bay	U	129
Peter's River	I	175	Whitbourne	I	320
The Dock	U	9	Whiteway	I	75
The Thicket	U	27	Winterton	I	240
Thornlea	U	56	Woodford's	U	16
Tilton	I	135			
			TOTAL		19,113

UNIT 2

Low Stratum

Adeytown	U	15	Middle Amherst Cove	U	24
Amherst Cove	U	13	Musgravetown	I	185
Birchy Cove	U	10	New Bonaventure	U	29
Bonavista	I	1,250	Newman's Cove	U	62
Cannings Cove	U	96	Port Union	I	180
Catalina	I	310	Southern Bay	U	56
Dunfield	U	49	Southport	U	49
Elliston	I	165	Spillars Cove	U	37
Gooseberry Cove	U	53	Upper Amherst Cove	U	20
Little Catalina	I	190			
Lockston	U	1	TOTAL		2,879
Melrose	I	85			

Medium Stratum

Bloomfield	U	193	Milton	U	70
Brittania	U	30	North West Brook	U	75
Bunyan's Cove	U	159	Old Bonaventure	U	30
Caplin Cove	U	29	Open Hall	U	26
Champney's West	U	38	Plate Cove East	I	45
Clarenville	I	815	Plate Cove West	I	60
Come-By-Chance	U	75	Port Rexton	I	165
Duntara	I	35	Princeton	U	55
English Harbour	U	32	Queen's Cove	U	41
Ganny Cove	U	24	Red Cliff	U	17
Georges Brook	U	96	Shoal Harbour	I	290
Goobies	U	49	St. Jones Within	U	37
Goose Cove (near North			Snooks Harbour	U	22
Harbour)	U	34	Summerville	I	94
Hickman's Harbour	U	129	Sunnyside	I	180
Hodge's Cove	I	118	Sweet Bay	U	55
Ivany Cove	U	9	Swift Current	U	82
King's Cove	I	70	Trinity/Goose Cove	I	105
Knights Cove	U	28	Trouty	U	30
Lady Cove	U	42	Weybridge	U	40
Little Harbour	U	18			
Little Heart's Ease	U	126	TOTAL		3,759
Long Beach	U	42			
Lower Lance Cove	U	49			

High Stratum

Aspen Cove (Trinity Bay)	U	14	Brooklyn	U	53
Aspey Brook	U	15	Burgoyne's Cove	U	22

UNIT 2

High Stratum (Cont.)

Champney's	U	21	New Burnt Cove	U	34
Charleston	U	44	North Harbour	U	58
Clifton	U	18	Petley	U	40
Deep Bight	U	66	Port Blandford	I	195
Elliott's Cove	U	29	Portland	U	30
Garden Cove	U	47	Random Heights	U	7
Harcourt	U	66	Stock Cove	U	17
Hatchet Cove	U	29	Tickle Cove	U	22
Hillview	U	80	Trinity East	U	44
Jamestown	U	41	Waterville	U	10
Keels	I	30	Winter Brook	U	28
Lethbridge	U	185			
Monroe	U	16	TOTAL		1,277
Morley's Siding	U	16			

UNIT 3

Low Stratum

Burin	I	735	Lord's Cove	I	80
English Harbour East	I	65	Petit Forte	U	23
Harbour Mille	U	73	St. Lawrence	I	460
Little St. Lawrence	U	61			
			TOTAL		1,497

Medium Stratum

Bay L'Argent	I	130	Parkers Cove	I	90
Beau Bois	U	22	Point au Gaul	I	35
Frenchman's Cove	I	80	Point May	I	95
Fortune	I	645	Port au Bras	I	90
Garnish	I	240	Red Harbour	I	70
Grand Bank	I	1,080	Rushoon	I	125
Lamaline	I	150	South East Bight	U	29
Lawn	I	210	St. Bernards	I	135
Little Bay East	I	55	Winterland	I	65
Marystown	I	1,490			
Monkstown	U	28	TOTAL		4,864

High Stratum

Baine Harbour	I	60	Lewins Cove	I	130
Boat Harbour	U	53	Little Harbour East	U	13
Brookside	U	21	Rock Harbour	U	36
Corbin	U	9	Salmonier	U	13
Epworth	U	61	Spanish Room	U	42
Fox Cove/Mortier	I	115	Taylor's Bay	U	8
Grand Beach	U	22	Terrenceville	I	160
Grand Le Pierre	I	75	Woody Island	U	2
Jacques Fontaine	I	55			
Jean de Baie	U	42	TOTAL		917

UNIT 5

Low Stratum

Gander	I	2,950
TOTAL		2,950

Medium Stratum

Badger's Quay/Valleyfield/ Pool's Island	I	370	Greenspond	I	115
Eastport	I	190	Wesleyville	I	330
Glovertown	I	605	TOTAL		1,610

High Stratum

Aspen Cove	U	65	Island Harbour	U	70
Barr'd Islands/ Joe Batts Arm	I	295	Ladle Cove	U	58
Benton	U	63	Lumsden	I	165
Burnside	U	33	Main Point	U	48
Cape Freels	U	30	Mann Point	U	75
Carmanville	I	275	Musgrave Harbour	I	415
Centreville	I	135	Newton	I	140
Change Islands	I	165	Noggin Cove	U	74
Charlottetown	U	89	Salvage	I	65
Cull's Harbour	U	24	Sandringham	I	60
Dark Cove/Middle Brook/Gambo	I	690	Sandy Cove	I	60
Deadman's Bay	U	62	Seldom/Little Seldom	I	130
Deep Bay	U	38	Shalloway Cove	U	42
Dover	I	195	Shoal Bay	U	17
Fogo	I	265	Stag Harbour	U	76
Fogo Island Centre	U	8	St. Brandans	I	105
Fredericton	U	109	St. Chads	U	26
Gander Bay South/ Harris Point	U	119	Terra Nova	I	20
Happy Adventure	I	100	Tilting	I	110
Hare Bay	I	355	Traytown	I	105
Indian Bay	I	40	Trinity	I	125
			Wareham	I	90
			TOTAL		5,231

UNIT 7

Low Stratum

Francois	U	53	Rencontre East	I	55
Gaultois	I	120	Wreck Cove	U	37
McCallum	U	59			
Mose Ambrose	U	22	TOTAL		346

Medium Stratum

Belleoram	I	135	Pool's Cove	I	70
Boxey	U	30	St. Albans	I	425
English Harbour West	U	80	St. Jacques/		
Hermitage/			Coombs Cove	I	260
Dawson's Cove	I	195			
Morrisville	I	45	TOTAL		1,240

High Stratum

Conne River	I	100	St. Joseph's Cove	U	35
Harbour Breton	I	515	St. Veronica's	U	24
Milltown/Head of					
Bay D'Espoir	I	320	TOTAL		1,119
Seal Cove	I	125			

UNIT 8

Low Stratum

No population

Medium Stratum

Black Duck Cove	U	5	Kettle Cove	U	12
Bluff Head Cove	U	49	Lewisporte	I	1,085
Botwood	I	1,120	Manuel's Cove	U	69
Crow Head	I	100	Ragged Point	U	31
Durrell	I	330	Twillingate	I	430
Gilliard's Cove	U	38			
			TOTAL		3,269

High Stratum

Alderburn	U	75	Little Burnt Bay	I	115
Appleton	I	105	Little Harbour	U	12
Bayview	I	150	Loon Bay	U	34
Birchy Bay	I	155	Luke's Arm	U	44
Boyd's Cove	U	95	Merritts Harbour	U	17
Bridgeport	U	57	Michael's Harbour	U	25
Brown's Arm	U	96	Moreton's Harbour	U	63
Campbellton	I	185	Newville	U	44
Carter's Cove	U	50	Norris Arm	I	300
Chanceport	U	17	Northern Arm/Exploits	I	80
Clarke's Head	U	112	Paradise	U	21
Cobb's Arm	U	50	Peterview	I	210
Comfort Cove/Newstead	I	165	Phillips Head	U	58
Cottlesville	I	85	Pike's Arm	U	28
Cottrell's Cove	U	96	Point Leamington	I	220
Embree	I	220	POint of Bay	I	55
Fairbank	U	81	Port Albert	U	35
Fortune Harbour	U	39	Porterville	U	25
Gayside	I	70	Purcell's Harbour	U	25
Glenwood	I	285	Rattling Brook	U	38
Glovers Harbour	U	34	Rodgers Cove	U	28
Greens Cove	U	3	Salt Harbour	U	31
Hatchet Harbour	U	19	Stanhope	U	86
Hillgrade	U	38	Stoneville	U	108
Horwood	U	140	Summerford	I	300
Indian Cove	U	22	Sunnyside	U	16
King's Island	U	25	Tizzard's Harbour	U	40
Lawrenceton	U	76	Toogood Arm	U	37
Leading Tickles West/ Leading Tickles South	I	145	Turtle Creek	U	23
			Victoria Cove	U	64

UNIT 8

High Stratum (Cont.)

Virgin Arm	U	177	Wings Point	U	64
Whale's Gulch	U	53			
			TOTAL		5,166

UNIT 9

Low Stratum

No population

Medium

Baie Verte	I	600
TOTAL		600

High Stratum

Beaumont/Lushes Bight	I	115	Port Anson	I	35
Brent's Cove	U	65	Purbeck's Cove	U	15
Brighton	U	80	Robert's Arm	I	245
Burlington	I	95	Round Harbour	U	11
Coachman's Cove	I	60	Seal Cove	I	170
Fleur de Lys	I	120	Shoe Cove	U	68
Galeville	U	16	Silverdale	U	20
Georges Cove	U	8	Smith's Harbour	U	28
Harbour Round	U	78	Snooks Arm	U	11
Harry's Harbour	U	57	South Brook	I	195
Jackson's Cove	U	28	Springdale	I	920
King's Point	I	200	St. Patricks	U	9
La Scie	I	345	The Beaches	U	35
Langdons Cove	U	16	Tilt Cove	I	10
Little Bay	I	85	Triton/Jims Cove/		
Little Bay Islands	I	115	Cards Harbour	I	290
Middle Arm	I	120	Westport	I	90
Miles Cove	I	50	Wild Bight	I	55
Ming's Bight	I	95	Wild Cove	U	38
Nickey's Nose Cove	U	7	Woodstock	I	85
Nippers Harbour	I	65			
Pacquet	I	100	TOTAL		4,375
Pilley's Island	I	125			

UNITS 10/11/12

Low Stratum

Grand Falls	I	2,250	Woodale	U	8
Grenfell Heights	U	134			
Windsor	I	1,420	TOTAL		4,102

Medium Stratum

Badger	I	270	Millertown	I	70
Bishop's Falls	I	1,100	Millertown Junction	U	6
Buchans	I	450			
			TOTAL		1,896

High Stratum

Buchans Junction	U	68
TOTAL		68

UNIT 14

Low Stratum

Burgeo	I	540	Fox Roost	U	33
Cartyville	U	9	Grand Bruit	U	30
Dennis Hill	U	6	Grey River	U	57
Diamond Cove	U	31			
			TOTAL		746

Medium Stratum

Barachois Brook	U	105	Petites	U	26
Berry Head/Port au Port	I	220	Piccadilly	U	134
Black Duck	U	27	Port au Port West/		
Boswarlos	U	62	Aguathuna/		
Burnt Islands	I	220	Felix Cove	I	205
Channel/Port aux Basques	I	1,615	Ramea	I	330
Cold Brook	U	54	Robinsons	U	79
Doyles	U	8	Romaines	U	66
Flat Bay	U	83	Rose Blanche/		
Flat Bay West	U	33	Harbour Le Cou	I	285
Grand Bay West	U	21	Stephenville	I	2,415
Kippens	I	315	St. George's	I	450
La Poile	U	45	St. Theresa	U	36
Lourdes	I	215	St. Theresa Station	U	12
Maidstone	U	31	Three Rock Cove	U	51
Margaree	U	68	Winterhouse	U	16
Mattis Point	U	53			
Noels Pond	U	30	TOTAL		7,310

High Stratum

Abrahams Cove	U	33	Isle aux Morts	I	285
Benoit's Siding	U	28	Jeffreys	U	71
Black Duck Brook	U	35	Jerry's Nose	U	15
Campbell's Creek	U	45	Journois	U	11
Cape Anguille	U	30	Loch Lomond	U	8
Cape Ray	U	118	Lockleven	U	20
Cape St. George	I	75	Long Grade	U	5
Coal Brook	U	41	Lower Cove	U	34
Codroy	U	89	Mainland	U	157
De Grau	U	135	Marches Point	U	59
Flat Bay Brook	U	5	McKay's	U	55
Fox Island River	U	20	Millville	U	37
Great Codroy	U	25	O'Regan's	U	34
Heatherton	U	84	Point au Mal	U	32
Highlands	U	47	Red Brook	U	54

UNIT 14

High Stratum (Cont.)

Searston	U	24	The Block	U	11
Sheaves Cove	U	49	Tompkins	U	41
Ship Cove	U	88	Upper Ferry	U	46
South Branch	U	68	West Bay	U	31
St. Andrew's	U	67	West Bay Centre	U	78
St. David's	U	62	Woodville	U	36
St. Fintan's	U	39			
Stephenville Crossing	I	515	TOTAL		2,842

UNIT 15

Low Stratum

Corner Brook	I	6,720	South Brook	I	100
Humber	U	16	Steady Brook	I	105
Lark Harbour	I	210	York Harbour	I	75
Massey Drive	I	105			
Pasadena	I	710	TOTAL		8,041

Medium Stratum

Benoit's Cove	U	346	Little Rapids	U	50
Cox's Cove	I	235	McIvers	I	160
Frenchman's Cove	U	87	Meadows	I	175
Gillams	I	310	Mount Moriah	I	180
Halfway Point	I	92	Pynn's	U	27
Hughes Brook	I	40	Spillway	U	63
Irishtown	I	180	Summerside	I	215
John's Beach	U	56			
Lake Siding	U	77	TOTAL		2,125
Little Harbour	U	12			

High Stratum

Gallants	I	30	Woods Island	U	1
			TOTAL		31

UNIT 16

Low Stratum

No population

Medium Stratum

Deer Lake	I	1,160
TOTAL		1,160

High Stratum

Cormack	I	185	Reidville	I	100
Hampden	I	180	Schooner Cove	U	13
Howley	I	115	Sop's Arm	U	94
Jackson's Arm	U	164	Wiltondale	U	12
Nicholsville	U	105			
Pollard's Point	U	132	TOTAL		1,100

UNIT 17

Low Stratum

New Ferolle	U	25	Port Saunders	I	190
Parsons Pond	I	140			
Port au Choix	I	290	TOTAL		645

Medium Stratum

Barr'd Harbour	U	3	Great Harbour Deep	I	70
Bartletts Harbour	U	38	Hawke's Bay	I	135
Bellburns	I	35	Portland Creek	U	26
Bird Cove	U	75	Reefs Harbour	U	28
Brig Bay	U	44	River of Ponds	I	70
CAstors River North	U	36	Three Mile Rock	U	30
Castors River South	U	38	Shoal Cove West	U	53
Daniel's Harbour	I	155			
Eddies Cove West	U	16	TOTAL		852

High Stratum

No population

GROS MORNE PARK

Low Stratum

No population

Medium Stratum

Bear Cove/Lobster Cove/			Sally's Cove	I	20
Woody Cove	U	94	St. Paul's	I	80
Curzon	U	27	Trout River	I	170
Cow Head	I	175	Winter House Brook	U	22
Glenburnie/Birch Head/			Woody Point	I	150
Shoal Brook	I	125			
Norris Point	I	240	TOTAL		1,423
RockyHarbour	I	320			

High Stratum

No population

UNIT 18

Low Stratum

No population

Medium Stratum

St. Anthony	I	795
TOTAL		795

High Stratum

Anchor Point	I	95	Nameless Cove	U	26
Bear Cove	U	46	Noddy Bay	U	19
Bide Arm	I	60	North Boat Harbour	U	23
Big Brook	U	4	Northeast Crouse	U	5
Black Duck Cove	U	44	Payne's Cove	U	27
Blue Cove	U	21	Pigeon Cove	U	18
Conche	I	110	Plum Point	U	42
Cook's Harbour	I	90	Pond Cove	U	20
Croque	U	35	Quirpon	U	50
Deadman's Cove	U	8	Raleigh	I	80
Eddie's Cove East	U	30	Roddickton	I	260
Englee	I	235	Sandy Cove	I	70
Flower's Cove	I	120	Savage Cove	U	78
Forresters Point	U	64	Ship Cove	U	66
Goose Cove	U	5	Shoal Cove East	U	8
Goose Cove East	U	65	Spillars Cove	U	27
Great Brehat	U	29	St. Anthony Bight	U	51
Green Island Brook	U	65	St. Barbe	U	23
Green Island Cove	U	53	St. Carols	U	22
Gunners Cove	U	13	St. Julien's	U	32
Hay Cove	U	16	St. Lunaire/Griquet	I	210
L'Anse aux Meadows	U	16	Wild Bight	U	13
Lower Cove	U	8			
Main Brook	I	125	TOTAL		2,527

APPENDIX 2
FINAL VERSION OF HOUSEHOLD SURVEY QUESTIONNAIRE

No._____

FUELWOOD STUDY MAILOUT QUESTIONNAIRE

(HOME)

City or Town_____

1. * During the past 12 months did you burn wood in your home?*

_____Yes (Continue with question 2.) _____No (Go to question 22.)

2. * Did you burn wood in: (Check more than 1 if applicable.)*

(a)_____an open fireplace
(b)_____a closed fireplace (glass doors)
(c)_____a fireplace insert or heatilator
(d)_____an airtight cook stove
(e)_____a non-airtight (old fashioned) cook stove
(f)_____an airtight heating stove
(g)_____a non-airtight (old fashioned) heating stove
(h)_____a wood furnace
(i)_____a wood/oil furnace
(j)_____a wood/coal furnace
(k)_____a hot water heater
(l)_____other (please specify)

3. * Approximately what percentage of your home heating is from wood?*

(a)___¼ or 25% (b)___½ or 50% (c)___3/4 or 75% (d)___all or 100%

or, do you use wood mainly for enjoyment or recreational purposes?_____

4. * For how long have you been burning wood?*

(a)_____less than 1 year
(b)_____1 to 2 years
(c)_____2 to 5 years
(d)_____more than 5 years

5. Do you now burn:

(a)_____more than
(b)_____less than
(c)_____same as when you started burning wood

6. What other source of heat do you use in your home (check more than one if applicable).

(a)_____oil furnace
(b)_____oil space heater
(c)_____electric
(d)_____cook stove
(e)_____kerosene (catalytic) heater
(f)_____other (please specify)
(g)_____none

*Questions used in follow-up telephone interview with non-respondents to mail questionnaire

7. How did you heat your house before you started using wood (check more than one if applicable).

(a)_____always used wood
(b)_____oil
(c)_____gas
(d)_____coal
(e)_____electrical heat

8. *How much wood did you burn in the last 12 months? *

(a)_____cords
(b)_____face cords
(c)_____turns
(d)_____pickup loads
(e)_____junks

A FACE CORD is a pile of wood measuring 4 feet by 8 feet. The wood is cut into 12", 16" or 18" pieces.

A FULL CORD is a pile of wood measuring 4 feet by 4 feet by 8 feet.

9. *Is the wood you use mainly: *

(a)_____softwood (fir, spruce, juniper)
(b)_____hardwood (birch)
(c)_____mixed

10. How do you presently obtain your fuelwood? Do you:

(a)_____cut your own
(b)_____buy from a fuelwood dealer
(c)_____buy mill slabs or scrapwood
(d)_____buy some (___%) and cut some (___%). Give percentage of each, total must equal 100%
(e)_____other (explain)_____

11. In what months do you cut or buy fuelwood:

____Jan. ____Feb. ____Mar. ____Apr. ____May ____June
____Jul. ____Aug. ____Sept. ____Oct. ____Nov. ____Dec.

*Questions used in follow-up telephone interview with non-respondents to mail questionnaire

12. Did you **BUY** fuelwood in the last 12 months?

_____Yes (Continue with question 13.) _____No (Go to question 18.)

13. How much did you pay for fuelwood?

(a) $_____per cord
(b) $_____per face cord
(c) $_____per pickup load
(d) _____¢ junk
(e) $_____per hundred junks

14. What was the **TOTAL** amount you spent on fuelwood in the last 12 months?

$_____

15. Did you buy mainly:

(a)_____softwood (b)_____hardwood (c)_____mixed

16. Was the wood you bought mainly:

(a)_____delivered (b)_____picked up by you at roadside

17. Is the price you paid in the last 12 months:

(a)_____higher than, (b)_____lower than, or
(c)_____same as you paid two years ago?

18. If you **CUT** your own wood, how far do you travel from your home?

(a)_____less than 1 mile
(b)_____1-5 miles
(c)_____ 5-10 miles
(d)_____10-25 miles
(e)_____more than 25 miles
(f)_____off the Avalon Peninsula (for Avalon residents only)

19. Do you cut from:

(a)_____Crown Land (b)_____private land (c)_____paper company land

20. *Do you transport wood by:*

(a)_____truck (d)_____snowmobile

(b)_____car (e)_____boat

(c)_____horse (f)_____other (please specify)

21. Do you plan to burn wood during the next 12 months?

(a)_____Yes (b)_____No

22. Did you burn artificial logs in the last 12 months in:

(a)___fireplace (b)___stove (c)___other (please specify)_____

23. How many artificial logs did you burn in the last 12 months?_____

24. What is the approximate size of your house?

(a)_____x_____(dimensions) (b)_____(number of square feet)

25. *Is your house: *

(a)_____single detached

(b)_____semi-detached

(c)_____apartment building, townhouse, duplex, fourplex

(d)_____other (please specify)_____

26. How many wood burning units (stoves, furnace, etc., but **NOT** fireplaces) do you have in your home?_____

27. Do you burn wood at a cabin or cottage which you own or rent? Include outdoor fires.

(a)_____No (b)_____Yes (Please fill out the short **COTTAGE** form on the next page.)

28. If you would like to receive a summary of the findings of this survey, and find out who won the cash prizes, please check here._____

THANK YOU

***Questions used in follow-up telephone interview with non-respondents to mail questionnaire**

No. _____

FUELWOOD STUDY MAILOUT QUESTIONNAIRE
(CABIN OR COTTAGE)

1. *In the last 12 months did you burn wood in:*

(a)____an open fireplace
(b)____a closed fireplace (glass doors)
(c)____a fireplace insert or heatilator
(d)____an airtight cook stove
(e)____a non-airtight (old fashioned) cook stove
(f)____an airtight heating stove
(g)____a non-airtight (old fashioned) heating stov
(h)____a wood furnace
(i)____a wood/oil furnace
(j)____a wood/coal furnace
(k)____a hot water heater
(l)____outdoors
(m)____other (please specify)_____

2. Did you burn wood mainly for:
(a)____heat (b)____cooking (c)____enjoyment

3. *How much wood did you burn in the last 12 months?*
(a)____cords (b)____face cords (c)____turns
(d)____pickup loads (e)_____junks

4. How did you obtain your fuelwood? Did you: (a)_____cut your own
(b)____buy from a fuelwood dealer (c)____buy mill slabs or scrapwood
(d)____buy some(___%)and cut some(___%). Give percentage of each, total must equal 100%.
(e)____other (explain)_____

5. Is the wood you use mainly: (a)____softwood (fir, spruce, juniper)
(b)____hardwood (birch) (c)____mixed

6. If you cut your own, is it generally from: (a)____Crown Land
(b)____private land (c)____paper company land

7. Did you burn artificial logs in the last 12 months in: (a)____fireplace
(b)____stove (c) other (please specify)_____

8. How many artificial logs did you burn in last 12 months?_____

9. What are the dimensions of your cabin _____x_____

10. Where is your cabin located: (a) Name of area_____
(b) Nearest community_____

*Questions used in follow-up telephone interviews with non-respondents to mail questionnaire

THANK YOU.

APPENDIX 3

UNIT FORESTER QUESTIONNAIRE

8 December 1983

Dear

As you know by now, NORTHLAND ASSOCIATES LIMITED is involved in another fuelwood survey for Newfoundland. This survey is to consist of 6,000 mail-out questionnaires and 4,000 telephone interviews throughout Newfoundland. The stratification that you have carried out for your unit will enable us to more accurately distribute our samples within the unit.

We would appreciate some additional information from you as part of our overall study.

Permits

Number of fuelwood cutting permits issued by year from 1972-1982. Could you comment on the use of permits in the unit as a reflection of the number of actual fuelwocd users in the unit.

Fuelwood Cutting Areas

Number of domestic fuelwood cutting areas in the unit. Could you comment on the types of stands that fuelwood cutters are using.

Problems Caused by Fuelwood Cutting

Comment on regeneration or degradation problems (if any) as a direct result of fuelwood cutting practices. Any comments on problems, if any, in controlling fuelwood cutting outside designated cutting areas would be appreciated.

Commercial Operators

Names and addresses of commercial fuelwood operators in the unit. Are the commercial fuelwood operators involved in sawlog and pulpwood operations?

How much fuelwood did each of these commercial operators cut last year? Do you have any comment on how this figure might compare to what is actually cut and sold in the unit.

Residue as Potential Fuelwood

List of sawmill operators in the unit and last year's return for each operator. From this we hope to obtain an estimate of sawmill residue that is potentially available for fuelwood.

Would you comment on residue use in the unit. Are people burning slabs or are the sawmills generally located too far from the communities.

Selling Price for Fuelwood

What would slabs, hardwood and softwood be sold for in the unit?

General

Please comment on your impressions of fuelwood supply and demand and anticipated problems and suggested remedial measures.

We realize that obtaining this information will require some effort on your behalf. But hopefully this will give all involved a better insight into the fuelwood situation in Newfoundland.

Enclosed for your information you will find a copy of the mailout questionnaire and covering letter. Six thousand of these questionnaires were mailed near the end of November.

Thanks for your help in the stratification process. Merry Christmas to you and your staff.

Yours truly,

J. P. Bouzane

J. P. Bouzane
Project Manager

Enclosures

APPENDIX 4
COMMERCIAL FUELWOOD RETAILER QUESTIONNAIRE

FUELWOOD RETAILERS INFORMATION FORM

NO._____

1. How many years have you been cutting firewood for sale?
   (a)_____1 year (c)_____6-10 years
   (b)_____2-5 years (d)_____more than 10 years

2. Do you cut firewood from:
   _____Crown Land _____private land
   _____Paper company land

3. What kind of operation do you have?
   _____Integrated firewood-sawlog-pulpwood operation
   _____Firewood-sawlog operation
   _____Firewood only
   _____Other (Please specify)_____

4. How far from your home do you travel to cut firewood?
   (a)_____less than 1 mile (d)_____10-25 miles
   (b)_____1-5 miles (e)_____more than 25 miles
   (c)_____5-10 miles (f)_____off the Avalon (for Avalon residents only)

5. What type of stand do you cut firewood from?
   _____Cutovers with standing birch _____Burned areas
   _____Budworm killed areas _____Softwood stands
   _____Normal hardwood stands (not cutovers)
   _____Other (Please specify)_____
   _____

6. What type of equipment do you use? (Snowmachines, forwarder, skidder, J-5, etc.)
   _____

7. In what months do you cut firewood for sale?
   _____Jan. _____Feb. _____Mar. _____April _____May _____June
   _____July _____Aug. _____Sept. _____Oct. _____Nov. _____Dec.

8. How much of each type of wood did you cut in the 1982-1983 season?
   Hardwood_____cords (or pickup loads_____)
   Softwood_____cords (or pickup loads_____)

9. In 1983-84 will you be cutting:
   (a)_____more than
   (b)_____less than (c)_____same as in 1982-1983

10. What species do you cut:
    ____Birch, ____Aspen, ____Fir, ____Spruce, ____Juniper, ____Pine
    ____Other (Please specify)_____
    _____

11. What species is the best seller:
    ____Birch, ____Aspen, ____Fir, ____Spruce, ____Juniper, ___Pine.

12. Do you sell most of your wood as:
    _____junks _____tree lengths
    _____other (Please specify)

13. In what area do you sell most of your wood?
    _____Central Nfld. _____South Coast _____Avalon Peninsula
    _____Western Nfld. _____Northern Peninsula
    _____Northeastern Nfld. _____Burin Peninsula

14. What were your total sales of firewood in 1982-83
    Hardwood_____cords (or pickup loads_____)
    Softwood_____cords (or pickup loads_____)

15. What was your overall average yearly sale of firewood in the last five years:
    Hardwood_____cords (_____pickup loads)
    Softwood_____cords (_____pickup loads)

16. In 1982-83, what was the selling price of your wood. (If you sold wood more than one way, please fill in all of the appropriate spaces.)
    Hardwood
    Price: Per cord_____ Per 100 junks_____
    Per pickup load_____ Other_____

Softwood

Price: Per cord_____ Per 100 junks_____
Per pickup load_____ Other_____

17. In what months do you sell most firewood:
____Jan. ____Feb. ____Mar. ____April ____May ____June
____July ____Aug. ____Sept. ____Oct. ____Nov. ____Dec.

18. Do you think the future demand for firewood will be
_____increasing _____decreasing _____the same as it is now

19. If you would like to receive a summary of the findings of this study please check here
_____

20. Comments _____
_____
_____
_____
_____
_____
_____
_____
_____
_____

THANK YOU.

POOR

QUALITY

ORIGINAL